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COMPENDIUM OF INDIAN MEDICINAL PLANTS VOLUME 5 1990-1994

Editor

Ram P. Rastogi

Authors

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B. N. Mehrotra

With technical assistance of

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&

National Institute of Science Communication and Information Resources, New Delhi

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VOLUME 5
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INDIAN MEDICINAL PLANTS

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EXPLANATORY INTRODUCTION

SCOPE

This Compendium has been designed as a companion volume to the Glossary of Indian Medicinal Plants by Chopra, Nayar & Chopra (hereinafter reffered to as Glossary). All the plants have been listed in alphabetical order and reference to the Glossary has been given for those plants which are included therein; in the case of new plants, not listed in the Glossary, their local name and distribution has also been included, wherever known, in keeping with the pattern of the Glossary. The distributional range of such plants has been confined to the present political boundary of India. Bhutan and Nepal have also been included because these countries fall within the unbroken chain of the Himalayas and some of the Himalayan species occur in contiguous territories In India, Bhutan and Nepal. Certain plants, although not found in India, are included either because these were listed in the Glossary or are sold in the indigenous drug market in India.

The literature cited is on the basis of complete screening of Chemical Abstracts and Biological Abstracts and covers the five-year period from 1990 to 1994. It has been aimed to make the Compendium exhaustive by including research done anywhere in the world on the taxa found in India, whether indigenous or introduced.

LITERATURE CITATION

The abbreviation of the reference citations are in accordance with the practice followed in **Chemical Abstracts and Serial Sources for the Biosis Data Base, Volume 1985**. Since many journals, especially those published in Latin American, African and South-east Asian countries, are not available in most

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Indian libraries and some journals have stopped publication or have changed their names, cross-references to Chemical Abstracts have been given in such cases.

BOTANICAL NOMENCLATURE

Since the nomenclature of many plants has undergone revision in the preceding decades, the names of plants, including those given in the Glossary and in the cited references, have been updated as far as possible to provide currently accepted names. In cases of change of name, the obsolete names have been given as synonyms according to the following order: the currently accepted name is followed by the name given the Glossary and then by the corresponding name listed in Hooker's *Flora of British India* or other subsequent relevant literature as addition to Indian flora (if it is different from the name listed in the Glossary), and finally by the title name of the plant given in the reference cited, if it is different from the earlier mentioned names. Similarly, the names of the natural orders (families) have also been revised whereas required according to the currently accepted pattern.

There is divergence of opinion among Indian botanists on the merits of maintaining or splitting of a few large genera like *Bauhinia*, *Euphorbia* and *Pylygonum*. In this Compendium, therefore, their existing generic status has been maintained.

The plant names mentioned under synonymy, in case of name change, have been incorporated in the text in their alphabetical order and cross references to their currently accepted names have been given to facilitate search for any particular plant on which information may be required.

INDEXES

Besides indexes of local names and of chemical substances isolated, two additional indexes namely biological activities and chemical structures, were provided in preceding volumes 1, 2, 3 and 4 to enhance the usefulness of the Compendium to all classes of readers. It may be mentioned that the indexes of chemical structures pertaining to Vols. 1 and 2 were compiled and given as addenda in reprint editions of these volumes. Thus, all the volumes contain four indexes each.

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In the index of chemical compounds trivial names have been used, wherever given, and no attempt has been made to include systematic names. Synonyms, as far as they have come to our knowledge, have been included in the index via "see". Substances not named by their discoverers have been listed simply by plant origin, e.g. 'Aesculus triterpene glycoside'. Since the list contained about 12,300 entries, help of computer has been taken to prepare the alphabetical list. A suitable computer programme has been developed for this purpose. Thus, the name of the compound is arbitarily divided into 3 components - the basic name, the prefixes such as (+), (-), D, L, cis, trans, α, β etc. and the substituents. Each substance has been indexed as far as possible under its basic name. For example: d-α-cadinene is indexed as cadinene, d-alpha-; O-demethyl-β-lumicolchicine as lumicolchicine, beta-, O-demethyl; 2-methyl-5-methoxy-1,4-napthoquinone as naphtho-quinone, 1,4-,2-methyl-5-methoxy.

SPECIAL FEATURES

In view of the fact that since 1960 researches on plants, both from the chemical and biological aspects, have been much more exhaustive than earlier, the pattern of the write-up on each plant has been suitably modified to include the new type of data/information. Besides summarising the results of biological evaluation of total extracts and fractions thereof and of chemical studies, each write-up has two new sections wherever necessary. A section on 'Biological Activity' gives a summary of all the pharmacological, biological and clinical work done on the pure constituents obtained from a plant. Similarly, a section on 'New Compounds' gives the complete structures of new substances isolated. It is hoped that these two new sections would add immensely to the usefulness of the Compendium by highlighting the results of chemical and biological studies on each plant in a systematic manner.

Central Drug Research Institute
Lucknow
February, 1998

Ram P. Rastogi
B.N. Mehrotra

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ACKNOWLEDGEMENTS

The editor would like to take this opportunity to express his gratitude to the Director General, Council of Scientific and Industrial Research, New Delhi, for sanctioning the project under which this Compendium series was undertaken. The first, second, third and fourth volumes of this series which were published in 1990, 1991, 1993 and 1995 respectively were well received; first and second volumes were reprinted in 1993 and subsequent volume 4 has also been reprinted. I am thankful to Dr. V.P. Kamboj, the former Director and Dr. C.M. Gupta the present Director of the Central Drug Research Institute, Lucknow, for providing financial assistance and all the infrastructural facilities for the completion of the present volume.

Thanks are due to Dr. S. Bhattarcharji, former Dy. Director, CDRI, Lucknow, for his invaluable help in correction of the manuscript and to Dr. O.N. Tripathi, the Scientist-incharge of the Library for his whole-hearted cooperation in providing the Library facilities. I also thank the staff members, Mr. R.C. Dwivedi and Mr. D.N. Vishwakarma for typing the manuscript and generally assisting in making it ready for the press; Mr. Dwivedi has also done the computer processing of the indexes.

I would particularly like to acknowledge the personal interest and support of Dr. C.M. Gupta and Dr. V.P. Kamboj, towards the publication of these volumes. I am thankful to the Authorities of National Institute of Science Communication (NISCOM), CSIR, New Delhi, for expeditious publication of these volumes.

RAM P. RASTOGI

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ABELMOSCHUS (Malvaceae)

A. moschatus Medik. syn. *Hibiscus abelmoschus* L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p.1).

Trans-2-trans-b-farnesyl acetate (64.22) and ambrettolide (14.96%) determined in seed essential oil by GC-MS (*Yunnan Zhiwu Yanjiu* 1990, *12*, 113; *Chem. Abstr.* 1990, *113*, 120594 v); stereoselective synthesis of farnesol (*J. Korean Chem. Soc.* 1992, *36*, 579; *Chem. Abstr.* 1992, *117*, 192097 r).

ABIES (Pinaceae)

A. excelsa DC.; see *Picea abies* (L.) Karst.

A. spectabilis (D.Don) Mirb. syn. *A. webbiana* Lindl. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.1).

Bornyl acetate (15.5,4.2), camphene (9.3,3.5), carvone (0.75,5.8), limonene (2.3,6.1), α-pinene (10.3,3.0) and β-pinene (3.3,5.1) determined in volatile oils of needles and twigs respectively collected from Kalinchok and Rasuwa Himalayan regions of Nepal by GC-MS (*J. Nepal Chem. Soc.* 1991, *10*, 20; *Chem. Abstr.* 1992, *117*, 23934 r).

A. webbiana Lindl.; see *A. spectabilis* (D.Don) Mirb.

ABROMA (AMBROMA) (Sterculiaceae)

A. augusta (L.) L.f. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mahrotra, PID, New Delhi, 1991, p.1).

Taraxerol, its acetate and lupeol isolated from leaves (*J. Inst. Chemists*, Calcutta 1992, *64*, 229; *Chem. Abstr.* 1993, *119*, 266502 j); maslinic acid and α-amyrin isolated from root bark; protocatechuic, vanillic and caffeic acids in their free, glycosidic and ester forms identified in root bark extract (*Dhaka Univ. Stud.* 1993, *41*B, 119; *Chem. Abstr.* 1994, *120*, 4566 h); a water-soluble polysaccharide fraction isolated from root bark and found to contain rhamnose, arabinose, xylose, mannose, galactose, glucose, galacturonic acid and glucuronic acid (*Indian J. Chem.* 1994, *33*B, 509); an acidic polysaccharide containing rhamnose, galacturonic acid and glucuronic acid isolated from root bark and partially characterised (*Carbohydr. Polym.* 1994, *24*, 277; *Chem. Abstr.* 1994, *121*, 276760 x).

ABRUS (Papilionaceae)

A. fruticulosus Wall. ex Wt. & Arn.

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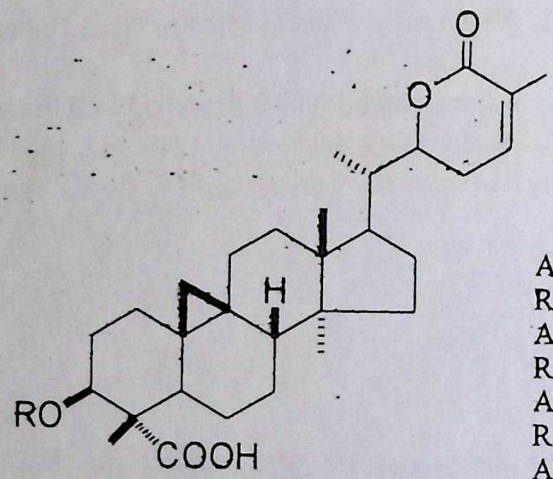
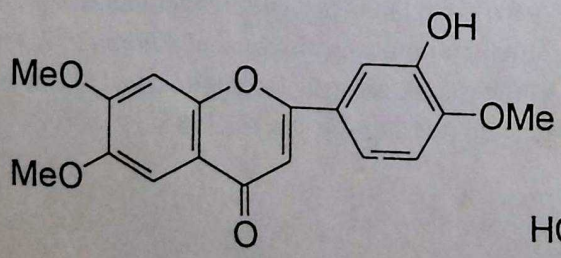
Four new triterpene glycosides - abrusosides A, B, C and D - in total yield 0.334% isolated from leaves and their structures established (*Planta Med.* 1990, *56*, 232).
Distribution : Throughout India, in plains.
NEW COMPOUNDS



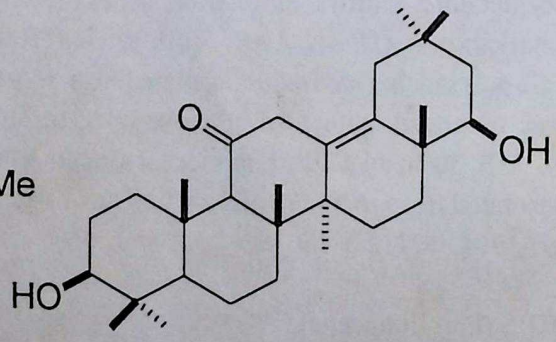
Abrusoside A
R = Glu
Abrusoside B
R = Gluc.acid(6-Me)(2→1)Glu
Abrusoside C
R = Glu(2→1)Glu
Abrusoside D
R = Gluc.acid(2→1)Glu

A. precatorius L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.1).

Premtorin isolated and its structure established and confirmed by synthesis (*Proc. Indian Natl. Sci. Acad.* 1989, *55*A, 50; *Chem. Abstr.* 1990, *112*, 55333 x); synthesis of premtorin (*Indian J. Chem.* 1989, *28*B, 1063); isolation of abrusosides A, B, C and D (total yield 0.389%) from leaves (*J. Nat. Prod.* 1989, *52*, 1118; Jpn. 3,209,394 (1991) Sep. 12; *Chem. Abstr.* 1992, *116*, 5556 j); a new sapogenol - abrisapogenol J - isolated from seeds and characterised; sophoradiol, its 22-O-acetate, hederagenin methyl ester, kaikasaponin III methyl ester, trimethyltryptophan dipolar ion, abrin abrusin and its 2"-O-apioside also isolated (*Chem. Pharm. Bull.* 1991, *39*, 116); oleic (46.4), arachidic (19.2), palmitic (15.8), behenic (13.4), stearic (4.9), linolenic (0.5%) and gallic acids and abrine determined in oil of white variety of seed by GC (*Pakistan J. Sci. Ind. Res.* 1993, *35*, 270; *Chem. Abstr.* 1993, *118*, 187832 t).
NEW COMPOUNDS



Premtorin



Abrisapogenol J

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BIOLOGICAL ACTIVITY

Abrusosides A, B, C and D were not acutely toxic to mice and did not cause mutagenesis in *Salmonella typhimurium* strain TM677; they were 30-100 times sweeter than sucrose (*J. Nat. Prod.* 1989, *52*, 1118).

ABUTILON (Malvaceae)

A. indicum G.Don; see *A. indicum* (L.) Sw.

A. indicum (L.) Sw. syn. *A. indicum* G.Don (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.2).

Alantolactone and isoalantolactone isolated (*Phytochemistry* 1989, *28*, 3525).

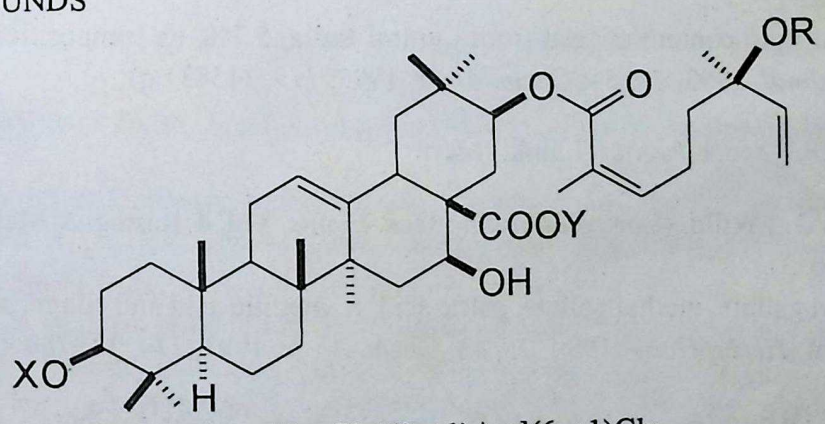
ACACIA (Mimosaceae)

A. arabica Willd.; see *A. nilotica* (L.) Willd. ex Delile ssp. *indica* (Benth.) Brenan

A. auriculiformis A.Cunn. ex Benth. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.3).

Two new triterpenoid bisglycosides - acaciasides A and B - isolated from fruits and their structures established (*Tetrahedron* 1992, *48*, 6717; *Indian J. Exp. Biol.*1993, *31*, 604); a new triterpenoid saponin (I) isolated from legumes and characterised as 3-O-{[β-D-xylosyl(1→3)-β-D-xylosyl(1→4)-α-L-rhamnosyl(1→2)][α-L-rhamnosyl(1→4)]-β-D-glucosyl}-3,16,21-trihydroxyolean-12-en-28-oic acid (*J. Nat. Prod.* 1992, *55*, 500).

NEW COMPOUNDS



X = Glu[(2→1)Ara](6→1)Glu
Y = Glu[(2→1)Xyl](6→1)Rha

Acaciaside A
R = Glu
Acaciaside B
R = Glu(2→1)Xyl

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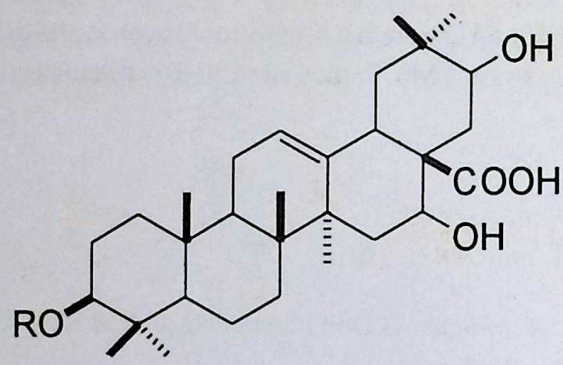

I

R = Glu[(2→1)Rha(4→1)Xyl(3→1)Xyl](4→1)Rha

BIOLOGICAL ACTIVITY

Acaciasides A and B at 4.0 mg/ml killed *in vitro* 97% of microfilaria of *Setaria cervi* in 100 min and 100% of adults in 35 min. At 0.1 g/kg, administered orally to rat implanted i.p. with *S. cervi* adults, they increased blood mf count 1.5 fold after first phase of treatment for 10 days. Following third phase of treatment reduced mf count by more than 80%. No toxic effect of saponins observed in rats (*Indian J. Exp. Biol.* 1993, *31*, 604).

A. caesia Wt. & Arn.; see *A. torta* (Roxb.) Craib

A. catechu (L.f.) Willd. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.3).

Total lipid content of seed from Central India, 5.7%; its composition determined (*J. Food Sci. Technol.* 1993, *30*, 54; *Chem. Abstr.* 1993, *119*, 115831 q).

A. concinna DC.; see *A. rugata* (Lamk.) Merr.

A. farnesiana (L.) Willd. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 3).

Ethyl gallate, methyl gallate, gallic acid, m-digallic acid and ellagic acid isolated from Egyptian plant (*Herba Hung.* 1990, *29*, 43; *Chem. Abstr.* 1991, *114,* 139780 v).

A. ferruginea DC. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 2).

Seed oil (2.6%) contained fatty acids composed of linoleic (37.2), oleic (27.2), palmitic (18.5), linolenic (13.7) and stearic (1.1%) acids and lipids consisting of neutral lipids (89.1), glycolipids (5.9) and phospholipids (5.0%) (*Indian J. Pharm. Sci.* 1993, *55*, 45).

A. leucophloea (Roxb.) Willd. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 4).

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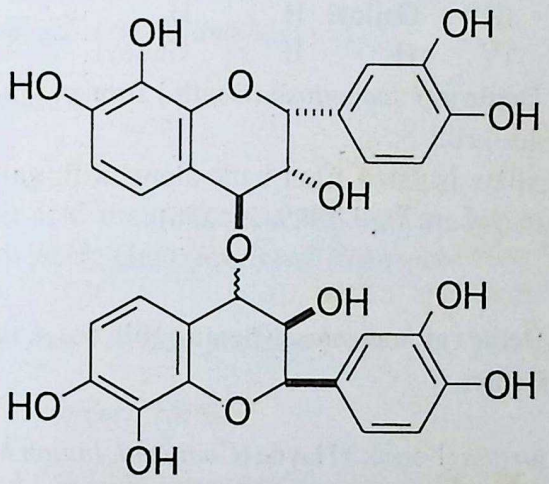
Mannitol, luteolin, β-sitosterol and its acetate isolated from pods (*Indian Drugs* 1990, *28*, 97); myricetin, quercetin, 3'-hydroxy-7-methoxyisoflavone, apigenin and its 8C-glucoside isolated from fresh flowers (*J. Indian Chem. Soc.* 1991, *68*, 673).

A. melanoxylon R.Br. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 4).

Isolation and structure determination of two [4-0-4]-linked isomeric biflavanoids - 2,3-cis-3,4-trans-3,7,8,3',4'-pentahydroxyflavan-[4-0-4]-2,3-cis-3,4-cis-3,7,8,3',4'-pentahydroxyflavans (I and II) - from heartwood (*Chem. Commun.* 1989, 1505).

NEW COMPOUNDS



I
~~ = α
II
~~ = β

A. nilotica (L.) Willd. ex Delile; see *A. nilotica* (L.) Willd. ex Delile ssp. *indica* (Benth.) Brenan

A. nilotica (L.) Willd. ex Delile ssp. *indica* (Benth.) Brenan syn. *A. arabica* auct. (non Willd.), *A. nilotica* (L.) Willd. ex Delile (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 7).

Chemical analysis of pods revealed presence of carbohydrate (47.75), protein (1.67) and lipid (1.41%); glucose, galactose, fructose, maltose, aspartic acid, glutamic acid, glycine, alanine, proline, leucine and threonine isolated from seeds (*Pakistan J. Sci. Ind. Res.* 1989, *32*, 405; *Chem. Abstr.* 1990, *112*, 18885 h); linoleic (39.2) and oleic (32.8%) acids determined in seed oil (5.2%) by GC-MS; traces of epoxy and hydroxy fatty acids also present (*J. Am. Oil Chem. Soc.* 1990, *67*, 433; *Chem. Abstr.* 1990, *113*, 96338 s); ethyl gallate, methyl gallate, gallic acid, m-digallic acid, catechol and ellagic acid isolated (*Herba Hung.* 1990, *29*, 43; *Chem. Abstr.* 1991, *114*, 139780 v); four derivatives of (+)catechin-5-gallate (I, II, III and IV) isolated from bark (*Phytochemistry* 1991, *30*, 2737); determination of α-spinasterol in volatile oil of Libyan plant (*Egypt. J. Pharm. Sci.* 1992, *33*, 599; *Chem. Abstr.* 1994, *120*, 265798 u).

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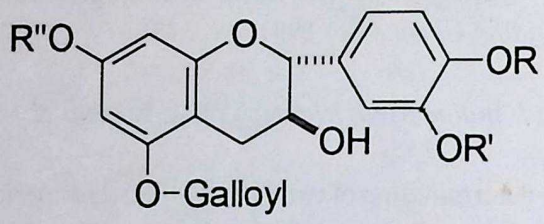
NEW COMPOUNDS



	R	R'	R"
I	H	H	H
II	H	Galloyl	H
III	Galloyl	H	H
IV	H	H	Galloyl

A. nilotica (L.) Willd. ex Delile ssp. *tomentosa* (Benth.) Brenan syn. *A. nilotica* (L.) Willd. ex Delile var. *tomentosa* (Benth.) Hill

(+)Catechin-5-gallate isolated from bark along with gallic acid, its methyl ester, naringenin and (+)catechin (*Planta Med.* 1989, *55*, 556).

Distribution : Rajasthan.

A. nilotica (L.) Willd. ex Delile var. *tomentosa* (Benth.) Hill; see *A. nilotica* (L.) Willd. ex Delile ssp. *tomentosa* (Benth.) Brenan

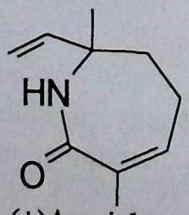
A. raddiana Savi syn. *A. tortilis* (Forssk.) Hayne (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 5).

A new hydrolysable tannin isolated from leaves and characterised as 1,3-di-O-galloyl-4,6-(-)hexahydroxydiphenoyl-β-glucose; 1-O-galloyl-β-glucose, 1,6-di-O-galloyl-β-glucose, 1,3,6-tri-O-galloyl-β-glucose, isorhamnetin-3-O-rutinoside, quercetin-3-O-rutinoside, quercetin-3-O-gentiobioside, quercetin-3-O-glucosylgalactoside, quercetin-3-O-glucoside and quercetin-3-O-galactoside also isolated (*Phytochemistry* 1991, *30*, 3767).

A. rugata (Lamk.) Merr. syn. *A. concinna* DC. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 7).

A new lactam - (+)acacialactam - isolated from seeds and its structure elucidated as 3,7-dimethyl-7-vinyl-2,5,6,7-tetrahydro-1H-azepin-2-one (*Chem. Pharm. Bull.* 1989, *37*, 3164); a process developed for isolation of (+)acacialactam from dry fruits (Jpn. 3,141,260 (1991) Jun. 17; *Chem. Abstr.* 1992, *116*, 28124 f).

NEW COMPOUNDS



(+)Acacialactam

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BIOLOGICAL ACTIVITY

(+)Acacialactam inhibited mitogenic activity and is used as immunosuppressant. At 48.0 μg/ml, it inhibited proliferation of T-cell and B-cell from mouse spleen *in vitro* by 34.0% (Jpn. 3,141,260 (1991) Jun. 17; *Chem. Abstr.* 1992, *116*, 28124 f).

A. torta (Roxb.) Craib syn. *A. caesia* Wt. & Arn. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 8).

Seed oil (4.2%) contained fatty acids comprising of linoleic (67.9), oleic (18.1), palmitic (7.8), stearic (5.2) and linolenic (0.3%) acids and lipids consisting of neutral lipids (86.5), glycolipids (7.0) and phospholipids (6.5%) (*Indian J. Pharm. Sci.* 1993, *55*, 45).

A. tortilis (Forssk.) Hayne; see *A. raddiana* Savi

ACALYPHA (Euphorbiaceae)

A. australis L.

Isolation of gallic acid, protocatechuic acid, caffeic acid, rutin, isoquercitrin, corilagin, furosin and geraniin from whole plant (*Saengyak Hakhoechi* 1993, *24*, 20; *Chem. Abstr.* 1993, *119*, 146439 x).

Distribution : Assam and Uttar Pradesh, in plains.

A. hispida Burm.f.; see *A. sanderi* N.E.Br.

A. sanderi N.E.Br. syn. *A. hispida* Burm.f. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 3).

Acalyphamide isolated from leaves (*Indian J. Chem.* 1992, *31*B, 133).

ACANTHOPANAX (Araliaceae)

A. aculeatum (Ait.) Seem.; see *Eleutherococcus trifoliatus* (L.) Hu

A. trifoliatus (L.) Merr.; see *Eleutherococcus trifoliatus* (L.) Hu

ACHRAS (Sapotaceae)

A. zapota L.; see *Manilkara zapota* (L.) P. van Royen

ACHYRANTHES (Amaranthaceae)

A. aspera L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 7).

Shoot essential oil showed antifungal activity against *Aspergillus carneus* (*Phytochemistry* 1992, *31*, 1811).

Isolation of a new aliphatic dihydroxyketone from shoots and characterisation as 36,47-

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dihydroxyhenpentacontan-4-one (*Phytochemistry* 1991, *30*, 2076); 17-pentatriacontanol isolated from shoots (*Phytochemistry* 1992, *31*, 1811); 27-cyclohexylheptacosan-7-ol and 16-hydroxy-26-methylheptacosan-2-one isolated from shoots and their structures established (*Phytochemistry* 1993, *33*, 221); pentatriacontane, 6-pentatriacontanone, hexatriacontane and tritriacontane isolated from stems, whereas hentriacontane, 10-octacosanone, 10-triacosanone and 4-tritriacontanone isolated from seeds (*Orient. J. Chem.* 1993, *9*, 84; *Chem. Abstr.* 1994, *120*, 265781 h).

A. bidentata Blume (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 4).

Root extract showed antimicrobial activity (*J. Indian Chem. Soc.* 1990, *67*, 1002).

A water-soluble oligosaccharide composed of six glucose units and three mannose units isolated from roots and partially characterised (*Huaxue Xuebao* 1989, *47*, 621; *Chem. Abstr.* 1990, *112*, 73741 h); a process developed for isolation of an antitumor polysaccharide from roots (CN 1,037,714 (1989) Dec. 06; *Chem. Abstr.* 1990, *113*, 218222 x); arginine, glycine, serine, aspartic acid, glutamic acid, threonine, proline, tyrosine, tryptophan, valine, phenylalanine and leucine identified in root extract (*J. Indian Chem. Soc.* 1990, *67*, 1002); oleanolic acid-α-L-rhamnosyl-β-D-galactoside isolated (*Farmatsiya* 1991, *41*, 14; *Chem. Abstr.* 1992, *116*, 18355 t); isolation of emodin and physcion from dried roots (*Fitoterapia* 1993, *64*, 85).

BIOLOGICAL ACTIVITY

Oligosaccharide from roots enhanced immune response (*Huaxue Xuebao* 1989, *47*, 621; *Chem. Abstr.* 1990, *112*, 73741 h); a polysacharide 'ABP' (100.0 - 800.0 μg/ml) from roots, induced *in vitro* synthesis of interleukin-1 as well as tumor necrosis factor-α and their secretion from thioglycolate-primed mouse peritoneal macrophages which explains its immunopotentiating effect (*Zhongguo Yaoli Xuebao* 1993, *14*, 332; *Chem. Abstr.* 1993, *119*, 173938 h); polysaccharide ABP (0.05 g/kg, i.p., or 0.25 g/kg, i.g.) inhibited growth of sarcoma-180 in ICR mice. ABP (0.05 and 0.1 g/kg, i.p.) prolonged survival time of mice bearing Ehrlich carcinoma. ABP (50.0 - 800.0 μg/ml) did not have direct cytotoxic effect *in vitro* on S-180 cells but enhanced cytotoxicity of peritoneal macrophages against S-180 cells. Antitumor activity of ABP may be related to its potentiating effect on both specific and nonspecific host immunological responses (*Zhongguo Yaoli Xuebao* 1993, *14*, 556; *Chem. Abstr.* 1994, *120*, 94948 m).

ACOKANTHERA (Apocynaceae)

A. spectabilis Hook.f. (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 5).

Acobioside A and 14-O-acetylacovenoside C isolated from seeds (*Fitoterapia* 1992, *63*, 333).

BIOLOGICAL ACTIVITY

Lethal dose of 14-O-acetylacovenoside C in guinea pig 0.21 mg/kg. At 50.0 μg/kg, i.v., it increased left intraventricular pressure in anaesthetised dogs by 15%, which lasted more than

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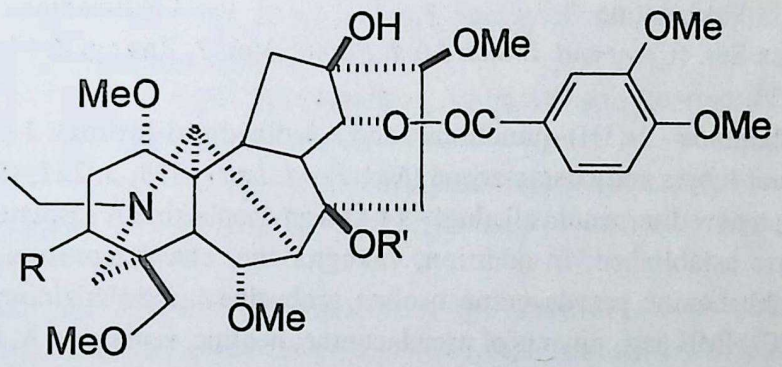
3hr. It increased by 20% myocardial contractile force (*Fitoterapia* 1992, *63*, 333).

ACONITUM (Ranunculaceae)

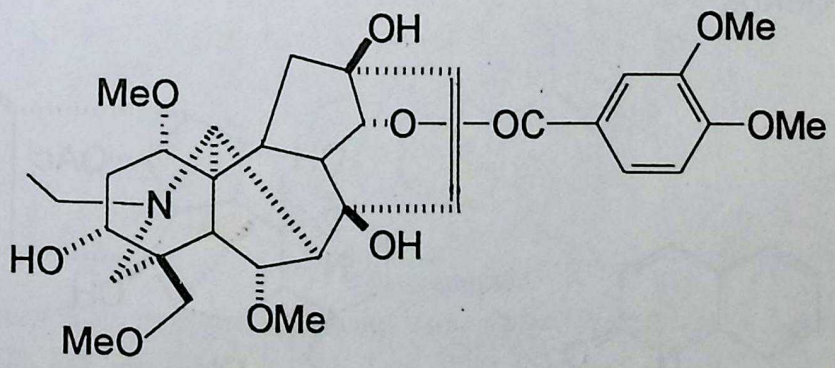
A. balfourii Stapf (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 4).

Three new norditerpenoids - 8-O-methylveratroylpseudaconine, veratroylbikhaconine and balfourine - isolated together with pseudaconitine, veratroylpseudaconine, indaconitine, ludaconitine, 8-deacetylyunaconitine, bikhaconitine, neoline and chasmanine; structures of new compounds established (*Heterocycles* 1992, *34*, 441); isolation of condelphine, bullatine, neoline, isotalatizidine, 1-O-methyldelphisine, pseudaconitine, yunaconitine, bikhaconitine and indaconitine from aerial parts (*Heterocycles* 1994, *38*, 833).

NEW COMPOUNDS



8-O-Methylveratroylpseudaconine
R = α-OH, R' = Me
Veratroylbikhaconine
R,R' = H



Balfourine

A. bisma (Buch.-Ham.) Rap. syn. *A. palmatum* D.Don (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 8).

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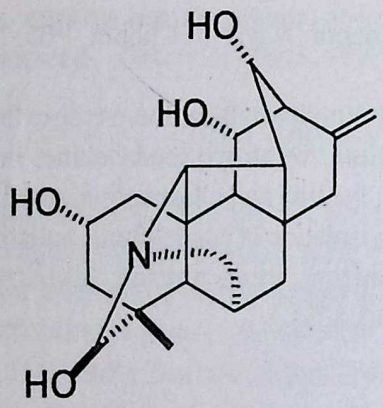
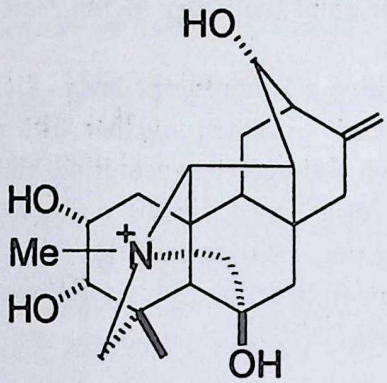
Two new diterpenoid alkaloids - vakhmatine and vakhmadine - isolated and their structures established; atisine and hetisine also isolated (*J. Nat. Prod.* 1991, *54*, 525).

NEW COMPOUNDS



Vakhmatine

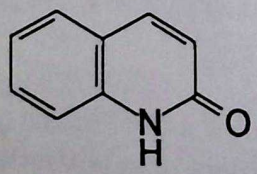


Vakhmadine

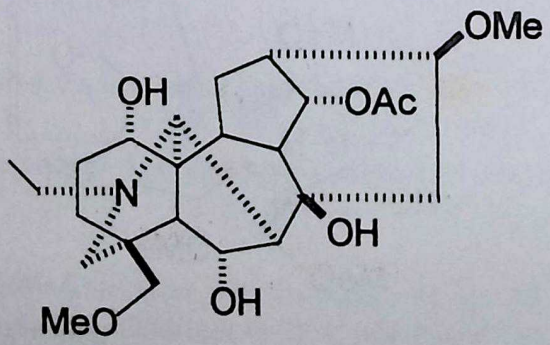
A. ferox Wall. ex Ser. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 9).

New alkaloids - 2-(1H)-quinolinone and 3,4-dihydro-6-hydroxy-2-(1H)-quinolinone - isolated from root tubers and characterised (*Nat. Prod. Lett.* 1993, *3*, 227; *Chem. Abstr.* 1994, *121*, 175172 b); a new diterpenoid alkaloid - 14-O-acetylsenbusine A - isolated from root tubers and its structure established; in addition, vakognavine, chasmaconitine, crassicauline A, falconericine, bikhaconine, pseudaconine, neoline, senbusine A, isotalatizidine and columbianine also isolated; ^{13}C-NMR assignments of pseudaconine, neoline, senbusine A, isotalatizidine and aconine revised (*Phytochemistry* 1994, *36*, 1527); four new lipoalkaloids - lipopseudaconitine, lipoyunaconitine, lipoindaconitine and lipobikhaconitine - isolated from root tubers and their structures established by ^{13}C-NMR; they were shown to be mixed C-8 linoleoyl, palmitoyl and stearoyl esters of veratroylpseudaconine, anisoylyunaconine, benzoylindaconine and veratroylbikhaconine (*J. Nat. Prod.* 1994, *57*, 105).

NEW COMPOUNDS



2-(1H)-Quinolinone



14-O-Acetylsenbusine A

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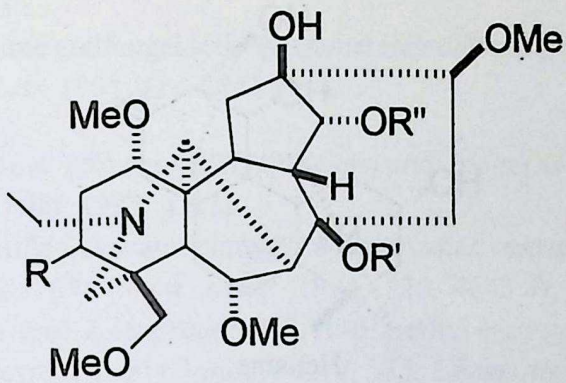
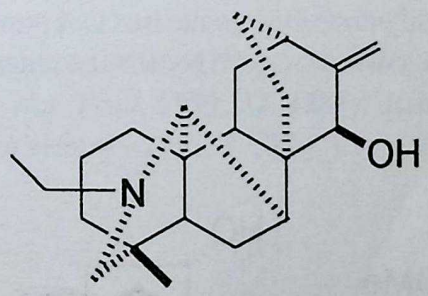


Lipopseudaconitine
R = OH, R' = Linoleoyl, palmitoyl and stearoyl, R" = Veratroyl
Lipoyunaconitine
R = OH, R' = Linoleoyl, palmitoyl and stearoyl, R" = Anisoyl
Lipoindaconitine
R = OH, R' = Linoleoyl, palmitoyl and stearoyl, R" = Benzoyl
Lipobikhaconitine
R = H, R' = Linoleoyl, palmitoyl and stearoyl, R" = Veratroyl

A. gymnandrum Maxim. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 9).

Isolation and structure elucidation of gymnandine along with 14-acetyl-8-O-methyltalatisamine, acoforine, columbidine, aconitine, ranaconitine, talatizidine, isotalatizidine, gymnaconitine, talatisamine and atisine hydrochloride (*Yaoxue Xuebao* 1993, *28*, 188; *Chem. Abstr.* 1993, *119*, 156207 j).

NEW COMPOUNDS



Gymnandine

A. heterophyllum Wall. ex Royle (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 10).

Molecular and crystal structure of hetisine determined (*J. Inclusion Phenom. Mol. Recognit. Chem.* 1992, *14*, 311; *Chem. Abstr.* 1993, *119*, 160603 c).

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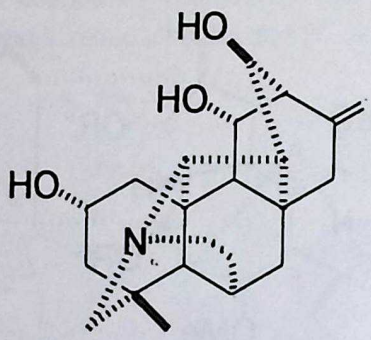

Hetisine

A. palmatum D.Don; see *A. bisma* (Buch.-Ham.) Rap.

ACORUS (Araceae)

A. calamus L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 10).

Synthesis of α-asarone (*Tetrahedron Lett.* 1989, *30*, 4037); β-asarone (92.68%) determined in rhizome oil (4.5%) by GC-MS (*Indian Perfum.* 1990, *34*, 282; *Chem. Abstr.* 1991, *114*, 214153 y; *Sepu* 1993, *11*, 267; *Chem. Abstr.* 1994, *120*, 4643 f); cis-asarone isolated from oil (*Indian Perfum.* 1990, *34*, 199; *Chem. Abstr.* 1991, *114*, 214150 v); structure of an arylindane derivative (I) confirmed by synthesis (*J. Chem. Res., Synop.* 1992, 36; *Chem. Abstr.* 1992, *116*, 194016 s); calamensesquiterpinenol isolated and its crystal structure determined (*Zhongguo Yaowu Huaxue Zazhi* 1993, *3*, 201; *Chem. Abstr.* 1994, *121*, 78242 s); a new phenylpropane derivative isolated from rhizomes and characterised as 1-(p-hydroxyphenyl)-1-(O-acetyl)-prop-2-ene (*Pharmazie* 1993, *48*, 786; *Chem. Abstr.* 1994, *120*, 27515 e); a new tricyclic sesquiterpene - calamenone - together with calamendiol and isocalamendiol isolated from roots (*Yakugaku Zasshi* 1994, *114*, 182; *Chem. Abstr.* 1994, *121*, 53966 t).

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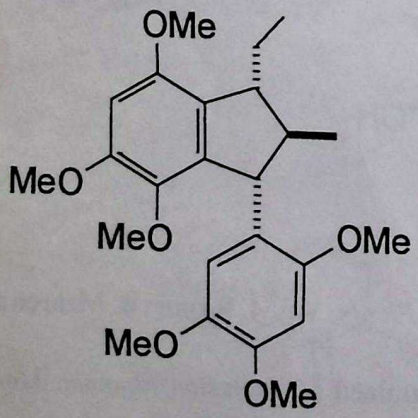
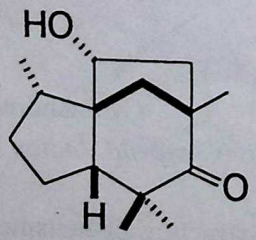
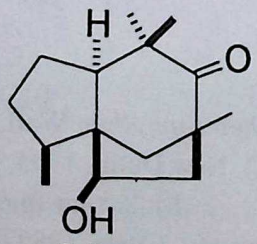


I



Calamensesquiterpinenol



Calamenone

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BIOLOGICAL ACTIVITY

Cis-asarone showed antifungal activity against *Helminthosporium oryzae* (*Indian Perfum.* 1990, *34*, 199; *Chem. Abstr.* 1991, *114*, 214150 v).

A. gramineus Soland. syn. *A. tatarinowii* Schott (*Compend. Indian Med. Plants*. Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 12).

β-Asarone identified as major component in rhizome essential oil of Chinese plant by GC-MS (*Sepu* 1993, *11*, 267; *Chem. Abstr.* 1994, *120*, 4643 f); chroman-1-one, 2,2,3,5-tetramethylshyobunone and 2-isopropenyl-8,10-dimethyl-bicyclo[4,4,0]-deca-1-one also identified by GC-MS in essential oil (*Sepu* 1993, *11*, 335; *Chem. Abstr.* 1994, *120*, 129500 p).

A. tatarinowii Schott; see *A. gramineus* Soland.

ACROCEPHALUS (Lamiaceae)

A. capitatus (Roth) Benth.; see *A. hispidus* (L.) Nicolson & Sivadason

A. hispidus (L.) Nicolson & Sivadason syn. *A. indicus* (Burm.f.) O.Kuntze, *A. capitatus* (Roth) Benth. (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 6).

(+)1,2-Epoxypulegone (lippione) isolated from aerial parts (*Planta Med.* 1992, *58*, 388).

A. indicus (Burm.f.) O.Kuntze; see *A. hispidus* (L.) Nicolson & Sivadason

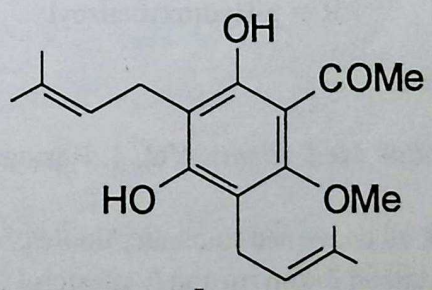
ACRONYCHIA (Rutaceae)

A. laurifolia Blume; see *A. pedunculata* (L.) Miq.

A. pedunculata (L.) Miq. syn. *A. laurifolia* Blume (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 11).

A new arylketone - 1-[2',4'-dihydroxy-3',5'-di(3"-methylbut-2"-enyl)-6'-methoxy] phenylethanone (I) - isolated from root bark along with acronylin, acrovestone, bergapten and β-amyrin; structure of new compound established (*Phytochemistry* 1989, *28*, 1278); crystal structure of acrovestone determined (*J. Nat. Prod.* 1989, *52*, 1284); demethylacrovestone isolated from fruits and characterised (*Phytochemistry* 1991, *30*, 1709).

NEW COMPOUNDS



I

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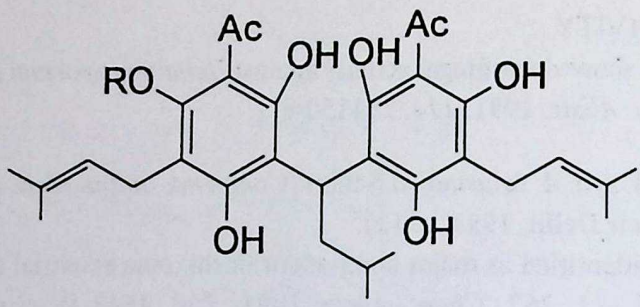


Acrovestone
R = Me
Demethylacrovestone
R = H

BIOLOGICAL ACTIVITY

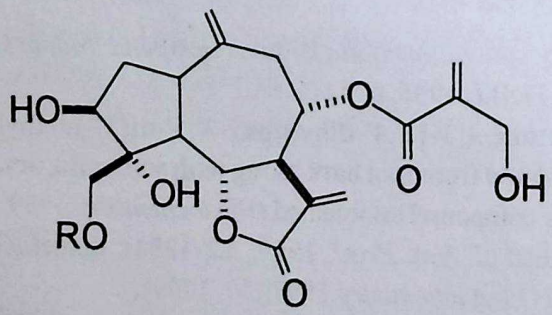
Acrovestone showed potent cytotoxicity (100% inhibition at 0.5 μg/ml) in KB tissue culture assay. In A-549, P-388 and L-1210 test systems ED50 values were 0.98, 3.28 and 2.95 μg/ml respectively (*J. Nat. Prod.* 1989, *52*, 1284).

ACROPTILON (Asteraceae)

A. repens (L.) DC. syn. *Centaurea picris* Pall. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 11).

Centautin (2,4-bis-(O-tolylazo)-naphth-1-ol) isolated (*Xibei Shifan Daxue Xuebao Ziran Kexueban* 1990, 48; *Chem. Abstr.* 1992, *116*, 55505 n); a sesquiterpene - picrolide A - isolated and its structure established (*J. Nat. Prod.* 1991, *54*, 276).

NEW COMPOUNDS



Picrolide A
R = p-Hydroxybenzoyl

ADANSONIA (Bombacaceae)

A. digitata L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 12).

Saponified root bark oil contained linolenic, linoleic, oleic, stearic and palmitic acids, whereas unsaponified oil contained β-amyrin and β-sitosterol (*Fitoterapia* 1992, *63*, 278).

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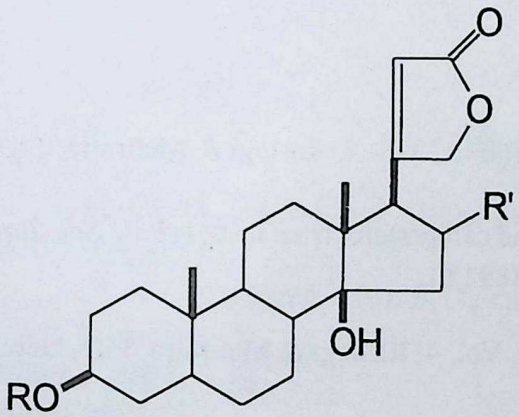
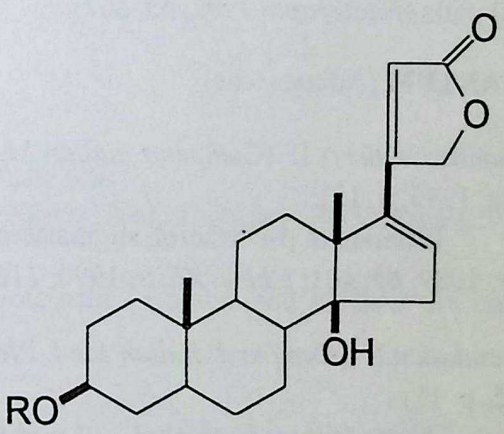
ADENIUM (Apocynaceae)

A. obesum Roem. & Schult. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 14).

New cardiac glycosides - obeside B, obeside C, obeside D, obebioside A, obebioside B, obebioside C, honghelotrioside A, obetrioside A and obetrioside B - isolated from roots and stems, whereas obebioside C and 16-dehydrodigitoxigenin-β-gentiobiosyl(1→4)-β-D-cymaroside (I) isolated from roots only; structures of all compounds established; somalin, honghelosides A and C, honghelin, 16-O-acetylstrospeside, oleandrigenin glucoside, 16-O-acetyldigitalinum verum, echujin, odoroside G and 16-O-acetylneogitosin also isolated from both roots and stems, whereas 16-dehydrosomalin, strospeside, odorobioside G, digitalinum verum and 16-dehydrodigitalinum verum from roots only (*Chem. Pharm. Bull.* 1990, *38*, 669); 2'-O-acetylobeside B, 2'-O-acetylhonghelin, 2'-O-acetylobebiosides A and B and 4-O-β-D-glucosyl-D-cymaritol isolated and characterised (*Chem. Pharm. Bull.* 1990, *38*, 1140).

NEW COMPOUNDS





Obeside B
R = Thevetose, R' = β-OAc
Obeside C
R = Thevetose, R' = β-OH
Obebioside A
R = Thevetose(4→1)Glu, R' = H
Obebioside B
R = Thevetose(4→1)Glu, R' = β-OAc
Obebioside C
R = Thevetose(4→1)Glu, R' = β-OH
Obetrioside A
R = Thevetose(4→1)Gentiobiose, R' = H
Obetrioside B
R = Thevetose(4→1)Gentiobiose, R' = β-OAc
Honghelotrioside A
R = Cymarose(4→1)Gentiobiose, R' = β-OAc

Obeside D
R = Thevetose
Obebioside D
R = Thevetose(4→1)Glu
I
R = Cymarose(4→1)Gentiobiose

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ADHATODA (Acanthaceae)

A. vasica Nees; see *A. zeylanica* Medik.

A. zeylanica Medik. syn. *A. vasica* Nees (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehotra, PID, New Delhi, 1995, p. 13).

Lignins composed of guaiacyl-, syringyl- and p-hydroxyphenyl-propane building units yielded vanillin, syringaldehyde and p-hydroxybenzaldehyde (*Himalayan Chem. Pharm. Bull.* 1989, *6*, 45; *Chem. Abstr.* 1990, *112*, 52307 f); vasicinol, vasicinone, deoxyvasicinone, deoxyvasicine (minor alkaloids) and vasicine isolated from leaves; percentage of minor alkaloids and total alkaloids showed seasonal variation; samples collected in Mar.-Apr. showed a higher percentage of minor alkaloids, whereas those collected in June-Sept. had higher content of vasicine (*Indian Drugs* 1990, *27*, 328); two new aliphatic hydroxyketones isolated from aerial parts and characterised as 37-hydroxyhexatetracont-1-en-15-one and 37-hydroxyhentetracontan-19-one (*Phytochemistry* 1991, *30*, 3799); 29-methyltriacontan-1-ol along with β-sitosterol isolated from aerial parts (*Fitoterapia* 1992, *63*, 262).

ADIANTUM (Adiantaceae)

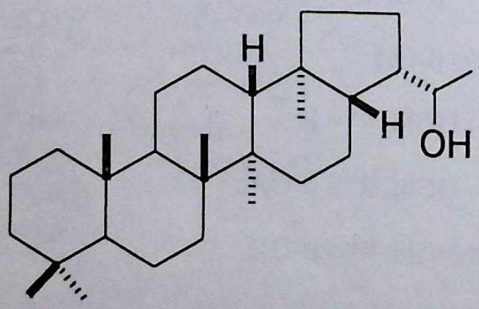
A. capillus-veneris L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 13).

Isolation of β-sitosterol, stigmasterol and campesterol from leaves (*Boll. Soc. Ital. Biol. Sper.* 1989, *65*, 461; *Chem. Abstr.* 1990, *112*, 73892 h).

A. caudatum L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 13).

A new triterpene alcohol - 29-norhopan-22-ol - isolated and its structure elucidated; β-sitosterol, its glucoside, quercetin-3-O-glucoside, filic-3-ene and adiantone also isolated (*J. Indian Chem. Soc.* 1990, *67*, 86).

NEW COMPOUNDS



29-Norhopan-22-ol

A. pedatum L. (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 11).

Isolation and structure elucidation of three new triterpenoids - 23-hydroxyfernene,

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glaucanol A and filicenoic acid - from leaves (*Chem. Pharm. Bull.* 1993, *41*, 268).

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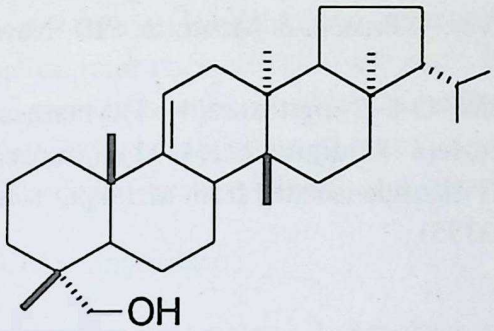
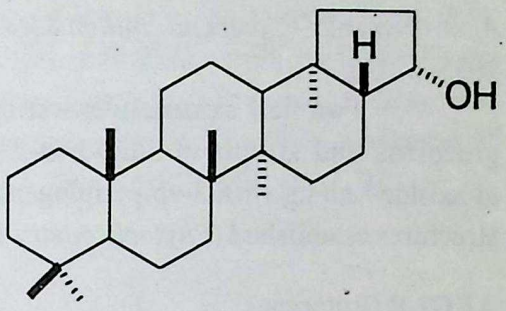
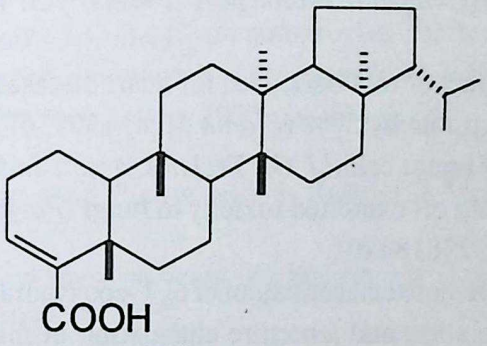


23-Hydroxyfernene



Glaucanol A

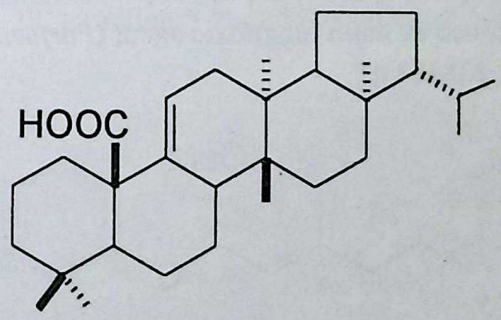


Filicenoic acid

A. venustum D.Don (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 11).

A new triterpene - fern-9(11)-en-25-oic acid - isolated and its structure established (*Phytochemistry* 1991, *30*, 3478).

NEW COMPOUNDS



Fern-9(11)-en-25-oic acid

ADINA (Rubiaceae)

A. cordifolia (Willd. ex Roxb.) Benth. & Hook.f. ex Brandis (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 13).

Ursolic acid and quercetin-3-O-galactoside isolated from leaves (*J. Indian Chem. Soc.* 1993, *70*, 181).

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ADONIS (Ranunculaceae)

A. aestivalis L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 14).

Two new cardenolides - strophanthidin-3-O-β-D-digitoxose(4→1)cymarose(4→1)-glucoside and strophanthidin-3-O-β-D-digitoxose(4→1)digitoxose(4→1)diginose(4→1)-glucoside - along with 3-epiperiplogenin and helveticoside isolated from aerial parts and their structures established (*Phytochemistry* 1992, *31*, 3195).

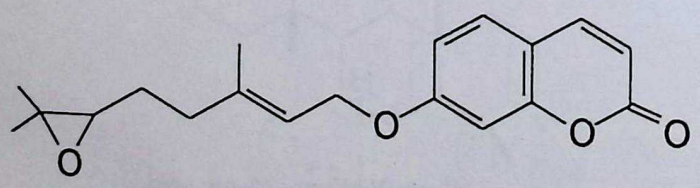
AEGLE (Rutaceae)

A. marmelos (L.) Correa (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 14).

Methanolic extract of root bark used for heart diseases; at a concentration of 100.0 μg/ml, it inhibited heart beat rate by 50% (*Planta Med.* 1991, *57*, 43); seed oil showed beneficial effects in regeneration of tumor cells (*J. Oil Technol. Assoc. India* 1993, *25*, 55, 59; *Chem. Abstr.* 1994, *120*, 212605 x); leaf oil exhibited toxicity to fungi (*Parfuem. Kosmet.* 1993, *74*, 714,719; *Chem. Abstr.* 1994, *121*, 238183 d).

Isolation and structure determination of 6',7'-epoxyaurapten from roots (*J. Indian Chem. Soc.* 1989, *66*, 424); isolation and structure elucidation of marmesin-1"-α-L-rhamnoside and 1,5-dihydroxy-6-methoxy-2-methylanthraquinone from stem; isolation of lupeol and β-sitosterol (*Proc. Natl. Acad. Sci. India* 1991, *61*A, 465; *Chem. Abstr.* 1992, *117*, 44563 z); 2-(2-hydroxy-4-methoxyphenyl)vinyl acetate and xanthotoxol-8-O-β-D-glucoside isolated from heartwood together with β-sitosterol (*J. Indian Chem. Soc.* 1991, *68*, 452); oleic (31.2), palmitic (22.7), linoleic (22.6), linolenic (19.6) and stearic (3.7%) acids determined in seed oil (40.7%) by GC-MS (*J. Oil Technol. Assoc. India* 1993, *25*, 55, 59; *Chem. Abstr.* 1994, *120*, 212605 x); 1,8-cineole (27.15%) determined as main fungitoxic agent (*Parfuem. Kosmet.* 1993, *74*, 714, 719; *Chem. Abstr.* 1994, *121*, 238183 d).

NEW COMPOUNDS



6',7'-Epoxyaurapten

BIOLOGICAL ACTIVITY

Aurapten found to be the most potent inhibitor of heart beat rate, IC50 0.6 μg/ml (*Planta Med.* 1991, *57*, 43); coumarin at 0.1 mg/ml was cytotoxic against P-815 and P-388 cell lines. It showed moderate antitumor effect against allogenic sarcoma-180 in mice; doses of 10.0 and 40.0 mg/kg caused inhibition of 29.0 and 60.0% respectively (*Pharmazie* 1992, *47*, 139; *Chem. Abstr.* 1992, *116*, 227817 j); oral administration of marmin (10.0 - 50.0 mg/kg) to rats

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inhibited appearance of ethanol-induced gastric haemorrhagic lesions in dose-dependent manner with ED50 17.2 mg/kg. Intragastric administration of marmin (25.0 mg/kg) significantly inhibited gastric motor activity. It exhibited concentration-dependent relaxation of contraction induced by acetylcholine, transmural electrical stimulation and histamine in isolated guinea pig ileum. These studies suggest that antiulcer effects of marmin are primarily due to maintenance of mucosal barrier integrity and inhibition of gastric motor activity and secondarily due to inhibition of effects of endogenous acetylcholine and histamine (*Jap. J. Pharmacol.* 1994, *66*, 139).

AERVA (Amaranthaceae)

A. javanica (Burm.f.) Juss. ex J.A. Schultes syn. *A. tomentosa* Forsk., *A. persica* (Burm.f.) Merr. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 18).

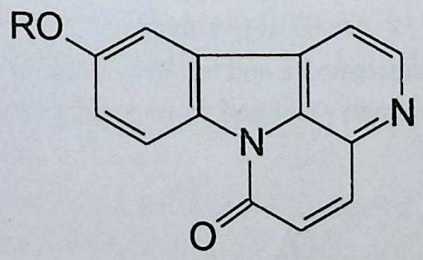
A new flavanol - isorhamnetin-3-O-β-[4'''-p-coumaroyl-α-rhamnosyl(1→6)galactoside] - isolated along with its unacylated compound and kaempferol-3-O-β-[4'''-p-coumaroyl-α-rhamnosyl(1→6)-galactoside] (*Phytochemistry* 1990, *29*, 1344).

A. lanata Juss. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 15).

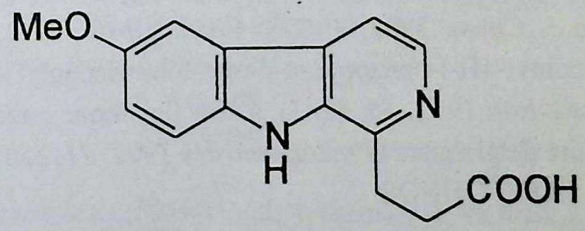
Plant extract did not show any significant diuretic activity in healthy human volunteers (*Indian J. Physiol. Pharmacol.* 1993, *37*, 135).

Hentriacontane, β-sitosterol, its glucoside, α-amyrin and betulin identified (*Fitoterapia* 1990, *61*, 188); β-sitosterol, daucosterol, syringic acid, vanillic acid, feruloyltyramine and feruloylhomovanillylamine isolated (*Khim. Prir. Soedin.* 1990, 694; *Chem. Abstr.* 1991, *115*, 68394 e); four new alkaloids - aervine, methylaervine, aervoside and aervolanine - isolated and their structures established and confirmed by ^{13}C-NMR and NOE data (*Khim. Prir. Soedin.* 1991, 388; *Chem. Abstr.* 1992, *116*, 148241 p; *Khim. Prir. Soedin.* 1991, 821; *Chem. Abstr.* 1993, *118*, 39230 e; *Planta Med.* 1992, *58*, 192); canthin-6-one and β-carboline-1-propionic acid also isolated (*Planta Med.* 1992, *58*, 192).

NEW COMPOUNDS



Aervine
R = H
Methylaervine
R = Me
Aervoside
R = Glu



Aervolanine

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A. persica (Burm.f.) Merr.; see *A. javanica* (Burm.f.) Juss. ex J.A. Schultes

A. tomentosa Forsk.; see *A. javanica* (Burm.f.) Juss. ex J.A. Schultes

AESCULUS (Hippocastanaceae)

A. hippocastanum L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 16).

(+)Pinitol, (+)penta-O-acetylpinitol, (-)quinic acid, (-)3,4,5-tri-O-acetylquinic acid, (-)1,3,4,5-tetra-O-acetylquinic acid, (-)quebrachitol, (-)penta-O-acetylquebrachitol, myoinositol, hexa-O-acetylmyoinositol and arabinose, glucose and galactose isolated from pericarp (*Pharmazie* 1991, *46*, 155; *Chem. Abstr.* 1991, *115*, 25984 e).

AFRAMOMUM (Zingiberaceae)

A. melegueta (Rosc.) K. Schum. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 8).

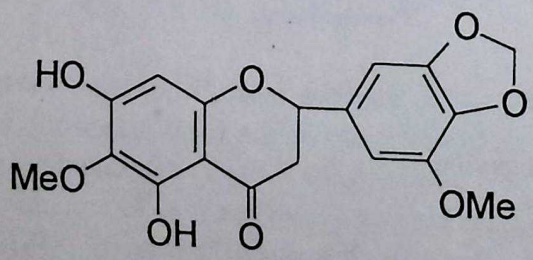
Humulene (31.3), its epoxide (27.7), β-caryophyllene (8.5), its epoxide (17.9) and linalool determined in seed oil by GC-MS (*Flavour Fragrance J.* 1991, *6*, 183; *Chem. Abstr.* 1992, *166,* 135979 k); both leaf and seed oils contained β-pinene (*J. Essent. Oil Res.* 1993, *5*, 81; *Chem. Abstr.* 1993, *118,* 197763 k).

AGAVE (Agavaceae)

A. americana L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 17).

A process for isolation of hecogenin developed (CN 1,048,547 (1991) Jan. 16; *Chem. Abstr.* 1991, *115,* 46338 n); leaves contained hecogenin (0.20%) (*Zhongcaoyao* 1991, *22,* 339; *Chem. Abstr.* 1992, *166,* 18396 g); isolation and characterisation of β-sitosterol-3-O-β-D-arabinofuranosyl(1→4)-O-α-L-rhamnopyranosyl(1→4)-O-β-D-glucopyranoside from roots (*Asian J. Chem.* 1992, *4*, 673; *Chem. Abstr.* 1992, *117,* 66609 w); 5-hydroxy-7-methoxy-2-tritriacontyl-4H-l-benzopyran-4-one, tetratriacontyl hexadecanoate and tetratriacontanol isolated (*Tetrahedron* 1992, *48*, 1281); a new flavanone - agamanone - isolated from aerial parts and its structure determined (*Phytochemistry* 1992, *31*, 2567).

NEW COMPOUNDS



Agamanone

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R
581·6340954
RAS-C·5

BIOLOGICAL ACTIVITY

5-Hydroxy-7-methoxy-2-tritriacontyl-4H-l-benzopyran-4-one and tetratriacontyl hexadecanoate exhibited significant antibacterial activity (*Tetrahedron* 1992, *48*, 1281).

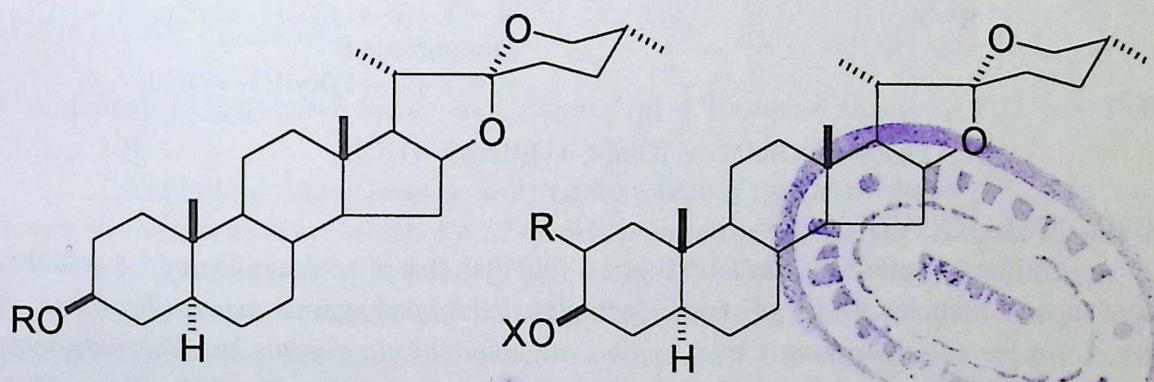
A. angustifolia Haw. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 21).

Hecogenin, dehydrohecogenin and tigogenin isolated from leaves (*Rev. Latinoam. Quim.* 1992, *23,* 28; *Chem. Abstr.* 1994, *121,* 31110 g).

A. cantala (Haw.) Roxb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 17).

Two new steroidal glycosides - agavesides A and B - isolated from fruits and their structures established (*Phytochemistry* 1990, *29*, 937); agaveside C isolated and characterised (*Phytochemistry* 1991, *30*, 1336); agaveside D isolated from fruits and its structure elucidated (*Phytochemistry* 1991, *30*, 4187); isolation of gitogenin, hentriacont-26-enol, ethyl 10,18,21-trimethylhexacosanoate, methyl 10,18,21-trimethylhexacosanoate, tricosanyl monocosanoate, β-sitosterol and its glucoside (*Pharmazie* 1991, *46*, 361; *Chem. Abstr.* 1992, *116*, 102668 e).

NEW COMPOUNDS



Agaveside A
R = Glu[2→1)Gal(3→1)Xyl](3→1)Glu[(2→1)Xyl](3→1)Xyl

Agaveside B
R = Glu[(2→1)Gal(3→1)Glu(2→1)Xyl](3→1)Xyl

X = Glu[(2→1)Rha(4→1)Xyl](3→1)Glu[(2→1)Rha](3→1)Glu

Agaveside C
R = α-OH

Agaveside D
R = H

139448

A. sisalana Perr. ex Engelm. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 19).

Leaf extract exhibited antifungal activity (*Cienc. Cult.* 1989, *41*, 1218; *Chem. Abstr.* 1992, *116,* 18371 v).

Seven saponins - sisalanins A, B, C, D, E, F and G - separated from saponin complex; sisalanins B and D partially characterised; sisalanin B found to be composed of hecogenin, galactose and xylose whereas sisalanin D contained an additional rhamnose (*Cienc. Cult.* 1989,

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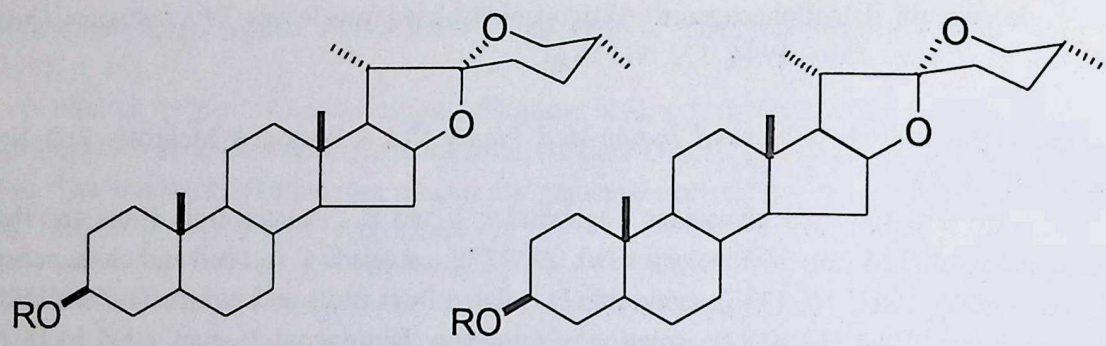
41, 1218; *Chem. Abstr.* 1992, *116*, 18371 v); two new tigogenin saponins - dongnosides A and B - isolated from dried fermented residues of leaf extract and their structures elucidated (*Chem. Pharm. Bull.* 1993, *41*, 557); dongnosides C, D and E isolated from fermented residues of leaf extract and characterised (*Phytochemistry* 1989, *28*, 2787).

NEW COMPOUNDS



Dongnoside A
R=X-(3→1)Xyl
Dongnoside B
R=X

Dongnoside C
R = Y-[(2→1)Xyl(4→1)Rha](3→1)Glu
Dongnoside D
R = Y-[(2→1)Xyl(3→1)Xyl](3→1)Glu
Dongnoside E
R = Y-[(2→1)Xyl](3→1)Glu

X = Gal(4→1)Glu[(2→1)Glu(4→1)Rha](3→1)Glu
Y=Gal(4→1)Glu

BIOLOGICAL ACTIVITY

Antifungal activity of sisalanin B was 4-fold than that of sisalanin D and 2.5-fold than that of saponin complex. M.I.C.of saponin complex determined against *Aspergillus flavus, A. niger, A. oryzae, A. parasiticus, Candida albicans, Rhodotorula glutinis* and *Saccharomyces cerevisiae* found to be in range of 12 to 100 ppm (*Cienc. Cult.* 1989, *41*, 1218; *Chem. Abstr.* 1992, *116*, 18371 v).

AGERATIA (Asteraceae)

A. riparia (Regel.) R.M. King & H. Robinson syn. *Eupatorium cannabinum* sensu Hook.f. (non L.) p.p., *E. riparium* Regel. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 20).

Methylripariochromene A (6-acetyl-7,8-dimethoxy-2,2-dimethylchromene) isolated from roots (*Phytochemistry* 1992, *31*, 1983).

BIOLOGICAL ACTIVITY

Methylripariochromene A showed antifungal activity against *Colletotrichum gloeosporioides* (*Phytochemistry* 1992, *31*, 1983).

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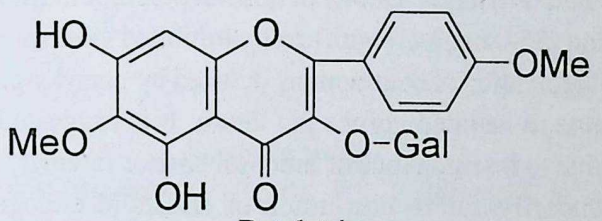
AGERATINA (Asteraceae)

A. adenophora (Spreng.) King & Robinson syn. *Eupatorium adenophorum* Spreng.; *E. glandulosum* Kunth (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 19).

A new flavonol glycoside - betuletrin - isolated from flowers along with betuletol (*Phytochemistry* 1990, *29*, 1011); α-cadinene, 2,3,4,4a,5,6-hexahydro-4,7-dimethyl-1-(1-methylethyl)naphthalen-6-ol and 1,2,3,5,8a-pentahydro-2-hydroxy-4,7-dimethyl-1-(1-methyl-ethyl)naphthalen-6-one isolated from essential oil (*J. Nepal Chem. Soc.* 1991, *10*, 30; *Chem. Abstr.* 1993, *118*, 56124 r); 6-hydroxykaempferol-7-(6"-caffeoyl) glucoside isolated from leaves and characterised (*Phytochemistry* 1993, *33*, 1275).

NEW COMPOUNDS



Betuletrin

AGERATUM (Asteraceae)

A. conyzoides L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 20).

Lycopsamine and echinatine isolated from herb (*Planta Med.* 1991, *57*, 578); a new chromene - 6-angeloyloxy-7-methoxy-2,2-dimethylchromene (I) - isolated from aerial parts and its structure established; precocene I, precocene II, 6-(1-methoxyethyl)-7-methoxy-2,2-dimethylchromene, 6-(1-ethoxyethyl)-7-methoxy-2,2-dimethylchromene, 6-(1-hydroxyethyl)-7-methoxy-2,2-dimethylchromene, 6-vinyl-7-methoxy-2,2-dimethylchromene, encecaline, inseparable mixture of three isomeric encecanescins, (+)sesamin, caryophyllene oxide and sitosterol also isolated (*Phytochemistry* 1991, *30*, 1137); 5,6,8,3',4',5'-hexamethoxyflavone and 8-hydroxy-5,6,7,3',4',5'-hexamethoxyflavone along with 5,6,7,5'-tetramethoxy-3',4'-methylenedioxyflavone, linderoflavone B, eupalestin, 5'-methoxy-nobiletin, nobiletin, 5,6,7,3',4',5'-hexamethoxyflavone and sinensetin isolated from aerial parts (*Phytochemistry* 1991, *30*, 1269); structure of compound designated as 5,6,8,3',4',5-hexamethoxyflavone was reassigned as 5,6,7,3',4',5'-hexamethoxyflavone (*Phytochemistry* 1993, *32*, 1076); essential oil from Vietnamese plant contained 6-demethoxyageratochromene (precocene I), ageratochromene (precocene II) and β-caryophyllene (*J. Essent. Oil Res.* 1989, *1*, 135; *Chem. Abstr.* 1990, *113*, 138300 f); precocene I and II identified in essential oil of fresh flowers and leaves of Fijian plant (*Flavour Fragrance J.* 1991, *6*, 117; *Chem. Abstr.* 1991, *115*, 189545 p); essential oil from Cameroon, Central Africa contained precocene I (81.0) and precocene II (0.2%) (*Flavour Fragrance J.* 1993, *8*, 1; *Chem. Abstr.* 1993, *119*, 24612 c); essential oil from Reunion, Indian Ocean, contained precocene I, β-caryophyllene and phytol (*Flavour Fragrance J.* 1993, *8*, 257;

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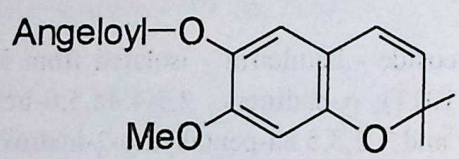
Chem. Abstr. 1994, *120*, 143644 v); determination of precocene I (80.29) and β-caryophyllene (7.04%) by GC-MS in essential oil (96.36%) of plant from Ghana (*J. Essent. Oil Res.* 1993, *5*, 113; *Chem. Abstr.* 1993, *118*, 240436 v).

NEW COMPOUNDS



I

BIOLOGICAL ACTIVITY

Oral administration of nobiletin (10.0-50.0 mg/kg) to male rats inhibited appearance of ethanol-induced gastric haemorrhagic lesions in dose-dependent manner (ED50 8.0 mg/kg). Its intragastric administration (25.0 mg/kg) significantly inhibited gastric motor activity. It exhibited concentration-dependent relaxation of contractions induced by acetylcholine, transmural electrical stimulation and histamine in isolated guinea pig ileum. It is suggested that antiulcer effects of nobiletin are primarily due to maintenance of mucosal barrier integrity and inhibition of gastric motor activity and secondarily due to prevention of effects of endogenous acetylcholine and histamine (*Jap. J. Pharmacol.* 1994, *66*, 139).

A. houstonianum Mill. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 21).

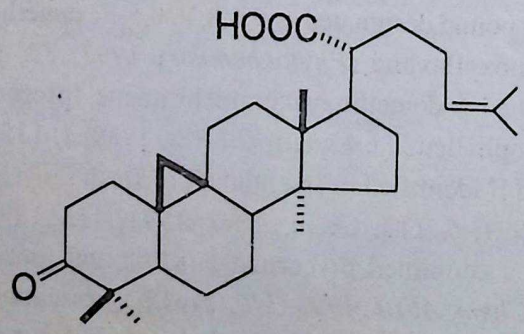
2,2-Dimethyl-6,7-dimethoxybenzopyran synthesised (*Youji Huaxue* 1989, *9*, 552; *Chem. Abstr.* 1990, *113*, 6104 k); determination of precocene I (32.0) and precocene II (24.0%) in essential oil of plant from Central Africa by GLC (*Flavour Fragrance J.* 1993, *8*, 1; *Chem. Abstr.* 1993, *119*, 24612 c).

AGLAIA (Meliaceae)

A. domestica (Correa emend. Jack) Peilegrin syn. *Lansium domesticum* Jack (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 22).

A new cycloartanoid triterpene - 3-oxo-24-cycloarten-21-oic acid (I) - isolated from leaves and its crystal structure determined (*Tetrahedron Lett.* 1989, *30*, 5615).

NEW COMPOUNDS



I

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A. elaeagnoidea (Juss.) Benth. syn. *A. roxburghiana* (Wt. & Arn.) Miq. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 24).

Structure of roxburghiadiol A revised and found to be 6β-epimer of roxburghiadiol B (*J. Nat. Prod.* 1990, *53*, 523).

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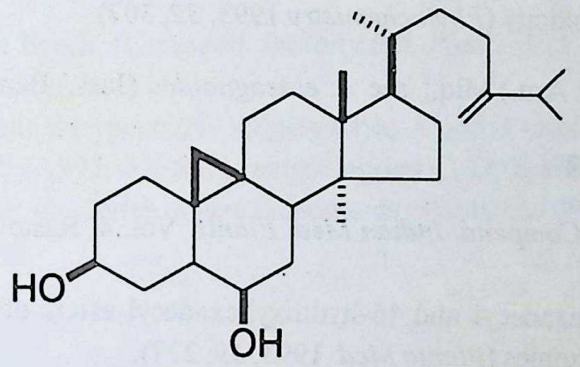
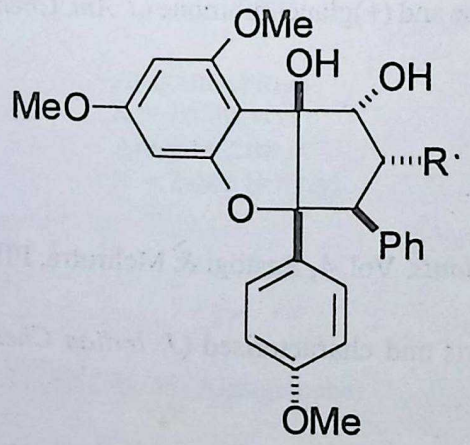


Roxburghiadiol A

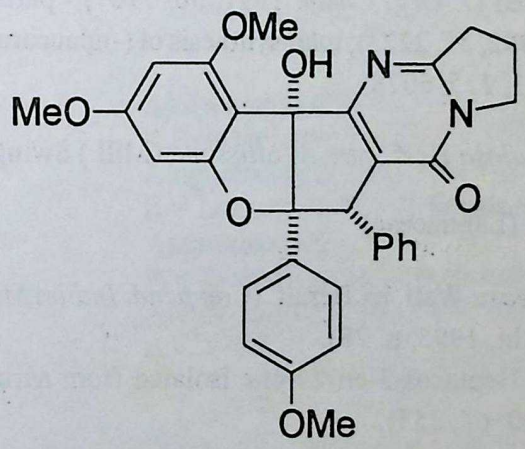
A. odorata Lour. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 23).

Rocaglamide isolated from twigs of Chinese plant and characterised (*Phytochemistry* 1993, *32*, 67, 307); isolation of three new benzofurans - desmethylrocaglamide, methyl rocaglate and rocaglaol - from leaves and their stucture elucidation (*Phytochemistry* 1993, *32*, 307); a new pyrimidinone (I) isolated and its crystal structure determined (*Chem. Commun.* 1994, 773).

NEW COMPOUNDS



Rocaglamide
R = $CONMe_2$
Desmethylrocaglamide
R = CONHMe
Methyl rocaglate
R = COOMe
Rocaglaol
R = H



I

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BIOLOGICAL ACTIVITY

Rocaglamide inhibited growth of larvae of variegated cutworms, *Peridorma saucia* and *Spodoptera litura*, LD50 values for fourth instar *P. saucia* larvae was 0.32 μg/larvae topically and 0.34 μg/larvae orally (*Phytochemistry* 1993, *32*, 67); rocaglamide and methyl rocaglate exhibited potent insecticidal activity against variegated *Peridorma saucia* through growth inhibition and contact toxicity (*Phytochemistry* 1993, *32*, 307).

A. roxburghiana (Wt. & Arn.) Miq.; see *A. elaeagnoidea* (Juss.) Benth.

AGROPYRON (Poaceae)

A. repens (L.) Beauv. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 25).

Isolation of hexadecyl and 16-hydroxyhexadecyl esters of (E)- and (Z)-p-hydroxy-cinnamic acid from rhizomes (*Planta Med.* 1993, *59*, 279).

AILANTHUS (Simaroubaceae)

A. altissima (Mill.) Swingle syn. *A. glandulosa* Desf. (*Compend Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 25).

Total synthesis of chaparrinone (*J. Am. Chem. Soc.* 1990, *112*, 9431; *ibid.* 1993, *115*, 6078); amarolide synthesised (*Bull. Chem. Soc. Jpn.* 1983, *56*, 3683; *J. Org. Chem.* 1991, *56*, 1119); total synthesis of shinjulactone C (*J. Org. Chem.* 1990, *55*, 5816); shinjulactone D synthesised (*J. Org. Chem.* 1991, *56*, 7167); partial synthesis of (-)shinjulactone H (*J. Org. Chem.* 1992, *57*, 2223); total synthesis of (-)glaucarubolone and (+)glaucarubinone (*J. Am. Chem. Soc.* 1993, *115*, 6078).

A. glandulosa Desf.; see *A. altissima* (Mill.) Swingle

AJUGA (Lamiaceae)

A. bracteosa Wall. ex Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 28).

Heptacos-3-en-25-one isolated from aerial parts and characterised (*J. Indian Chem. Soc.* 1990, *67*, 355).

A. forrestii Diels

A new phenanthro(3,2-b)furan - ajuforrestine A - isolated and its crystal stucture determined (*Chinese Chem. Lett.* 1994, *5*, 125; *Chem. Abstr.* 1994, *121*, 129890 m).
Distribution: Nepal, alt. 1000-2000 m.

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A. lupulina Maxim.

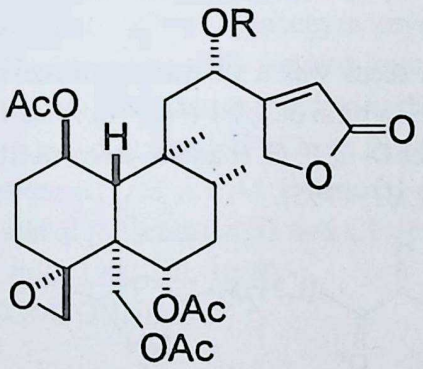
Chrysoeriol, diosmetin, kaempferide, quercetin, vanillic acid and β-sitosterol isolated from whole plant (*Lanzhou Daxue Xuebao, Ziran Kexueban* 1991, *27*, 93; *Chem. Abstr.* 1993, 118, 19270 q).

Distribution : Nepal.

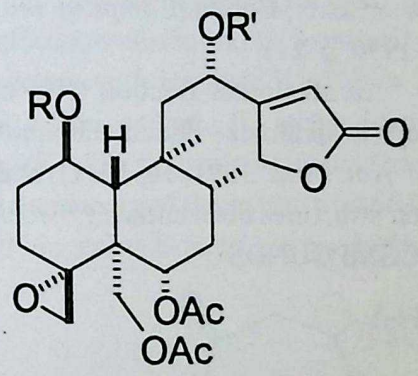
A. macrosperma Wall. ex Benth. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 28).

Two neo-clerodane diterpenoids - ajugamacrins A and B - isolated and their structures elucidated (*Phytochemistry* 1993, *33*, 887); ajugamacrins C, D, E and ajugapantin A isolated along with ajugacumbin B; structures of new compounds established (*Phytochemistry* 1993, *34*, 1091).

NEW COMPOUNDS



Ajugamacrin A
R = Isobutyryl
Ajugamacrin B
R = 2-Me Butyryl



Ajugamacrin C
R,R' = Isobutyryl
Ajugamacrin D
R = Isobutyryl, R' = 2-Me Butyryl
Ajugamacrin E
R = 2-Me Butyryl, R' = Isobutyryl
Ajugapantin A
R,R' = Ac

ALANGIUM (Alangiaceae)

A. chinense (Lour.) Harms syn. *A. kurzii* Craib, *Marlea begoniaefolia* Roxb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 28).

Chloroform extract (CA-4 fraction), which was devoid of anabasine, exhibited prominent sedative effect in rat. It enhanced hypomotility induced by reserpine and 5-hydroxytryptophan and also reduced hypermotility produced by p-chlorophenylalanine. It significantly decreased concentration of norepinephrine in cortex of dopamine and serotonin (5-HT) in brain stem, but

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increased concentration of 5-HT in cortex (*Zhonghua Yaoxue Zazhi* 1993, *45*, 447; *Chem. Abstr.* 1994, *120*, 69448 r)

A. kurzii Craib; see *A. chinense* (Lour.) Harms

A. lamarckii Thwaites; see *A. salvifolium* (L.f.)Wang.

A. salvifolium (L.f.)Wang. syn. *A. lamarckii* Thwaites (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 29).

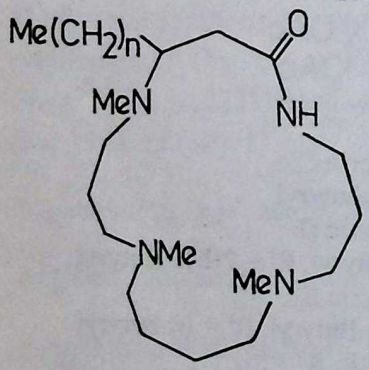
Synthesis of bharatamine (*Heterocycles* 1990, *31*, 1151); 3-O-demethyl-2-O-methyl-alangiside along with alangiside isolated from dried fruits and characterised (*Phytochemistry* 1994, *36*, 383).

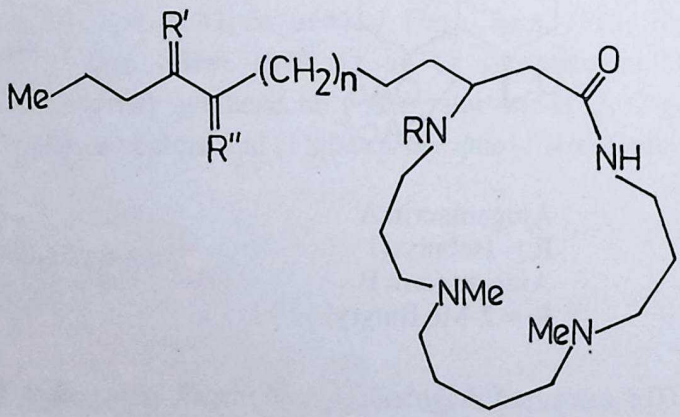
ALBIZIA (ALBIZZIA) (Mimosaceae)

A. amara (Roxb.) Boivin (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 21).

An alkaloidal fraction (X1) obtained from seeds was a mixture of three spermine macrocyclic alkaloids - budmunchiamines A, B and C in ratio of 4:4:1 (*Heterocycles* 1991, *32*, 1961; *J. Nat. Prod.* 1991, *54*, 1531); budmunchiamines D, E, F, G, H and I - isolated from seeds and their structures determined (*Phytochemistry* 1992, *31*, 1795).

NEW COMPOUNDS





Budmunchiamine A
n = 10
Budmunchiamine B
n = 8
Budmunchiamine C
n =12

	n	R	R'	R''
Budmunchiamine D	6	Me	O	H,H
Budmunchiamine E	6	Me	H,H	O
Budmunchiamine F	4	H	H,H	H,H
Budmunchiamine G	6	H	H,H	H,H
Budmunchiamine H	6	H	O	H,H
Budmunchiamine I	6	H	H,H	O

BIOLOGICAL ACTIVITY

Alkaloidal fraction (X1) was bactericidal but not mutagenic against *Salmonella typhimurium* strain TM677. It inhibited catalytic activity of DNA polymerase, RNA polymerase and HIV-1 reverse transcriptase. It also inhibited platelet aggregation, human lymphocyte transformation and cyclooxygenase activity (*J. Nat. Prod.* 1991, *54*, 1531).

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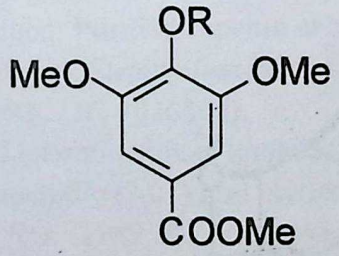
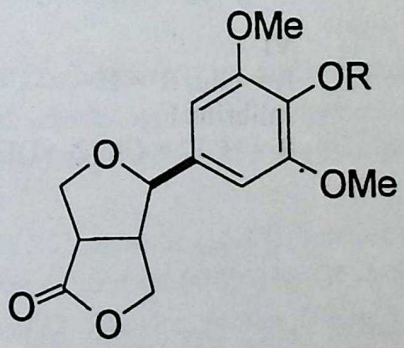
A. julibrissin Durazz. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 30).

Three new syringaresinol glycosides isolated from dried stem bark and characterised as (-)syringaresinol-4-O-β-D-apiofuranosyl(1→2)-β-D-glucopyranoside, syringaresinol-4-O-β-D-apiofuranosyl(1→2)-β-D-glucopyranosyl-4'-O-β-D-glucopyranoside and (-)syringaresinol-4,4'-bis-O-β-D-apiofuranosyl(1→2)-β-D-glucopyranoside; syringaresinol diglucoside also isolated (*Chem. Pharm. Bull.* 1991, *39*, 1623); isolation of five new lignoid glycosides from stem bark and their characterisation as 4-O-β-D-apiofuranosyl(1→2)-β-D-glucopyranosyl methyl syringate (I), glaberide I-4-O-β-D-glucopyranoside (II), glaberide I-4-O-β-D-apiofuranosyl(1→2)-β-D-glucopyranoside (III), (+)5,5'-dimethoxylariciresinol-4-O-β-D-apiofuranosyl(1→2)-β-D-glucopyraonoside (IV) and 5,5'-dimethoxy-7-oxolariciresinol-4'-O-β-D-apiofuranosyl(1→2)-β-D-glucopyranoside (V) (*Chem. Pharm. Bull.* 1991, *39*, 2952); isolation and characterisation of julibrotriterpenoidal lactone A from bark (*Zhongguo Zhongyao Zazhi* 1992, *17*, 357; *Chem. Abstr.* 1992, *117*, 188252 v); 3,4,5-trimethoxyphenol-1-O-β-D-apiofuranosyl(1→2)-β-D-glucopyranoside, vomifoliol-3'-O-β-D-apiofuranosyl(1→6)-β-D-glucopyranoside, (+)lyoniresinol-9'-O-β-D-glucopyranosyl(1→4)-β-D-glucopyranoside and (+)lyoniresinol-4,9'-di-O-β-D-glucopyranoside isolated from stem bark together with icariside E5 (*Chem. Pharm. Bull.* 1992, *40*, 534); three pyridoxine derivatives - VI, julibrines I and II - isolated from fresh stem bark and characterised (*Chem. Pharm. Bull.* 1992, *40*, 829); six new triterpenoid glycosides - julibrosides A1, A2, A3, A4, B1 and C1 - isolated from stem bark and their structures established; sapogenols of julibrosides B1 and C1 designated as julibrogenins B and C respectively (*Chem. Pharm. Bull.* 1992, *40*, 3269).

NEW COMPOUNDS



I
R = Glu(2→1)Apiose



II
R = Glu
III
R = Glu(2→1)Apiose

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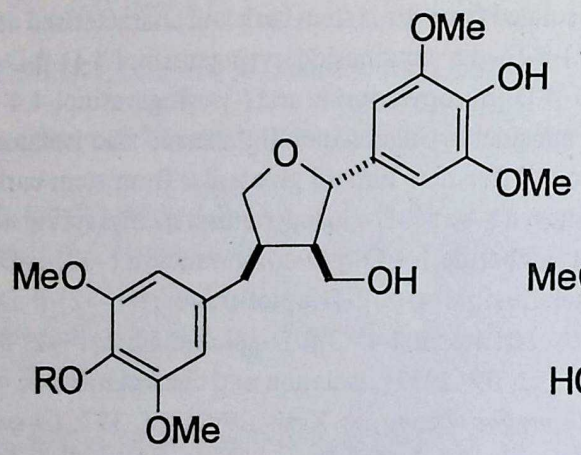

IV
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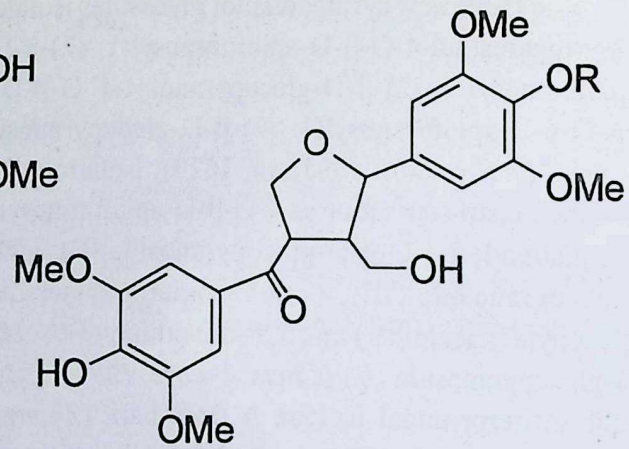
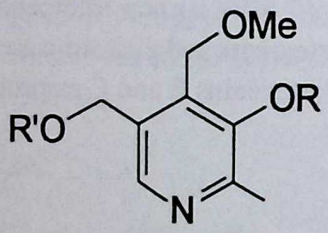
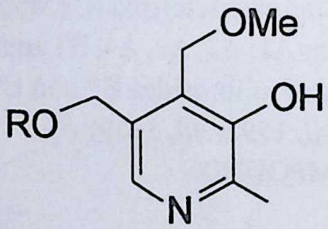


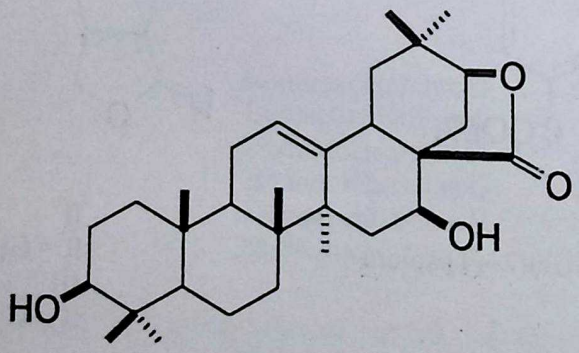
V
R = Glu(2→1)Apiose



VI
R = Glu, R' = H
Julibrine I
R = H, R' = Glu(2→1)Gluc.acid



Julibrine II
R = Glu(2→1)Apiofuranose



Julibrotriterpenoidal lactone A

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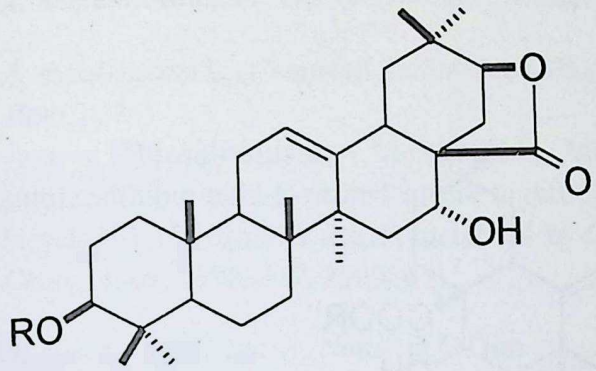

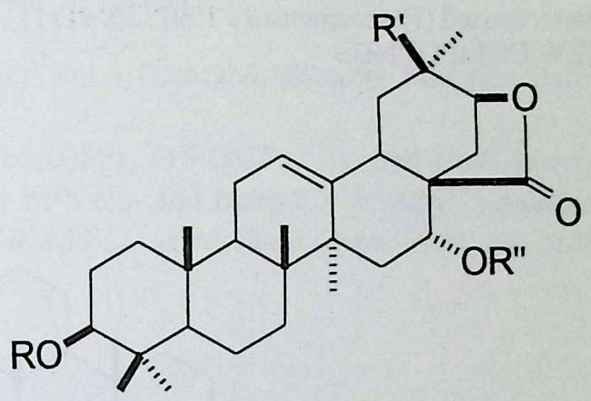

Julibroside A2
R = Glu(6→1)Fuc(2→1)Xyl
Julibroside A3
R = Glu(2-acetamido)(6→1)Fuc(2→1)Xyl

Julibroside A1
R = X, R' = Me, R" = H
Julibroside A4
R = Y, R' = Me, R" = Glu
Julibroside B1
R = Y, R' = CH_2OH, R" = Glu
Julibroside C1
R = X, R' = COOH, R" = H

X = Glu[(2→1)Glu](6→1)Fuc(2→1)Xyl
Y = Glu(4→1)Glu

BIOLOGICAL ACTIVITY

Julibrin II induced arrhythmia (*Chem. Pharm. Bull.* 1992, *40*, 829).

A. lebbeck (L.) Benth. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 30).

Saponins showed β-haemolysis against buffalo and sheep blood and α-haemolysis against human blood. Purified saponin showed antifungal activity against *Macrophomina phaseolina* (MIC 32.8 μg), *Stemphilum* species and *Fusarium solani* (*Pakistan Vet. J.* 1990, *10*, 146; *Chem. Abstr.* 1992, *116*, 102686 j).

Determination of linoleic (54.06), oleic (18.23), palmitic (16.17), behenic (4.37), stearic (2.71), arachidic (2.01) and myristic (0.11%) acids in seed oil (4.8%) by GC-MS (*Pakistan J. Sci. Ind. Res.*. 1989, *32*, 361; *Chem. Abstr.* 1990, *112*, 52299 e; *Indian J. For.* 1991, *14*, 154; *Chem. Abstr.* 1992, *117*, 86754 v); a new acyclic ester isolated and characterised as heneicos-7(Z)-enyl-24-hydroxytetracos-10(Z)-enoate; lupeol, oleanolic acid, docosanoic acid and β-sitosterol also isolated (*Indian J. Pharm. Sci.* 1991, *53*, 24).

A. lucida (Roxb.) Benth. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 30).

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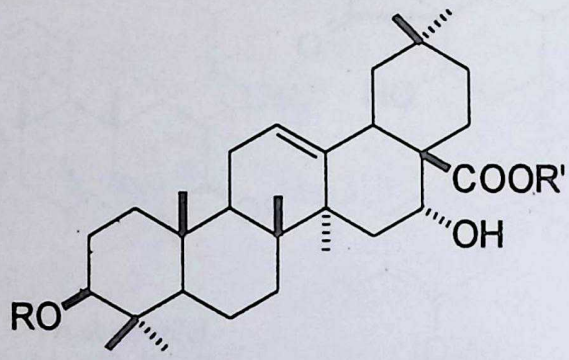
Three echinocystic acid-bearing saponins (I, II and III) isolated from seeds and characterised (*Phytochemistry* 1991, *30*, 4111).

NEW COMPOUNDS



I
R = Glu[(2→1)Glu](6→1)Ara, R' = H
II
R = Glu[(2→1)Glu](6→1)Ara(2→1)Xyl, R' = H
III
R = Glu(2-acetamido-2-deoxy)(6→1)Fucose(2→1)Xyl, R' = Me

A. odoratissima (L.f.) Benth. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 28).

Linoleic (29.70), oleic (24.01), palmitic (22.55), behenic (7.17), stearic (6.85), arachidic (3.86), myristic (2.63) capric (1.09), lauric (1.07) and lignoceric (1.07%) acids determined in seed oil (5.0%) by GC-MS; vitamin A (24 I.U.) and vitamin D (2 I.U.) also present (*Pakistan J. Sci. Ind. Res.* 1991, *34*, 305; *Chem. Abstr.* 1992, *116*, 170218 h; *Indian J. For.* 1991, *14*, 154; *Chem. Abstr.* 1992. *117*, 86756 v).

ALEURITES (Euphorbiaceae)

A. fordii Hemsl.; see *Vernicia fordii* (Hemsl.) Airy Shaw

ALLEMANDA (ALLAMANDA) (Apocynaceae)

A. blanchetii DC.

Diosgenin, β-sitosterol, trifolin, lupeol and its acetate isolated from flowers (*Indian J. Pharm. Sci.* 1989, *51*, 256).

Distribution : Native to Brazil, introduced into India in gardens.

ALLIUM (Liliaceae)

A. ampeloprasum L.; see *A. porrum* L.

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A. ampeloprasum L. var. *porrum* (L.) Regel; see *A. porrum* L.

A. ascalonicum L. (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 24).

Thiosulphinates - MeS(O)SMe, MeS(O)SPr, PrS(O)SPr, cis- and trans-propylsulphinothioic acid-S-propyl esters together with cis- and trans-2,3-dimethyl-5,6-dithiabicyclo[2.1.1]-hexane-5-oxides identified by GC-MS (*J. Agric. Food Chem.* 1992, *40*, 2431; *Chem. Abstr.* 1992, *117*, 250064 r).

A. bakeri Regel; see *A. chinense* G.Don

A. cepa L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 32).

Onion extract lowered fasting blood sugar level in alloxan-diabetic rats. When fed to diabetic human patients along with their food, it effectively controlled hyperglycaemia (*Indian J. Physiol. Pharmacol.* 1975, *19*, 213); aqueous extract showed no effect on fasting blood sugar level in man, but reduced rise in blood sugar, in dose dependent manner, in oral glucose tolerance test and activity was comparable to that of tolbutamide (*Indian J. Med. Res.* 1977, *65*, 422; *Curr. Med. Practice* 1984, *28*, 712); onion did not alter normal fasting level of blood cholesterol, fibrinogen and fibrinolytic activity after acute administration in man and chronic feeding in rabbits. It was concluded that onion affects these parameters only during hyperlipidaemia (*Indian J. Pharmacol.* 1976, *8*, 231); onion significantly counteracts coagulability-enhancing and fibrinolysis-lowering effects in cholesterol-fed rabbits, but it was less active than clofibrate (*Indian Med. J.* 1982, *76*, 126); total lipids, cholesterol and phospholipids were significantly lower in rabbits on cholesterol and onion extract diet, almost comparable to normal control group, than in animals on only cholesterol diet (*Curr. Sci.* 1982, *51*, 230); administration of aqueous extract of onion to sucrose-fed rabbits markedly reduced serum, liver and aorta triglycerides as well as serum and liver proteins (*Indian J. Physiol. Pharmacol.* 1979, *23*, 27); feeding of onion oil prevented ethanol-induced rise of cholesterol and triglycerides in serum, rise of total lipid in liver and accumulation of cholesterol in kidney and liver in rabbits (*Indian J. Biochem. Biophys.* 1984, *21*, 211).

New thiosulphinates - trans- and cis- methylsulphinothioic acid-S-1-propenyl esters (I), cis- and trans-propylsulphinothioic acid-S-1-propenyl esters (II), n-propylsulphinothioic acid-S-propyl ester (III) - and α-sulphinyldisulphides - trans-5-ethyl-4,6,7-trithia-2-decene-4-S-oxide (IV), trans, trans- and trans, cis-5-ethyl-4,6,7-trithia-2,8-decadiene-4-S-oxides (V,VI) and their diastereoisomers - isolated from onion juice (*Phytochemistry* 1989, *28*, 2373); (Z,Z)2,3-dimethyl-1,4-butanedithial-1,4-dioxide isolated, characterised and synthesised (*J. Am. Chem. Soc.* 1990, *112*, 4584); thiosulphinates - MeS(O)SMe, MeS(O)SPr, PrS(O)SPr, cis- and trans-esters (II) and cis- and trans-2,3-dimethyl-5,6-dithiabicyclo (2.1.1)hexane-5-oxides identified by GC-MS (*J. Agric. Food Chem.* 1992, *40*, 2431; *Chem. Abstr.* 1992, *117*, 250064 r); 1-(methylthio) - and 1-

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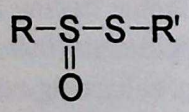
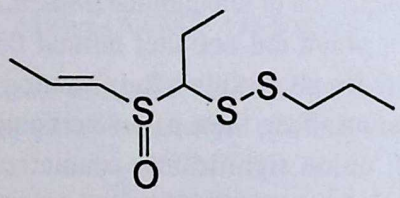
(propylthio)-1-propanthiols, 5,6-dihydro-2-methyl-4,6-diethyl-, 5,6-dihydro-6-methyl-2,4-diethyl- and 5,6-dihydro-2,4,6-triethyl-4H-1,3,5-dithiazines and 2,4,6-triethyl-1,3,5-trithiane identified in volatile oil by GC-MS (*Z. Lebensm-Unters. Forsch.* 1992, *195*, 459; *Chem. Abstr.* 1993, *118*, 79674 u); antihyperglycaemic agent, diphenylamine, isolated and its percentage is highest in mature bulbs (*J. Nat. Prod.* 1984, *47*, 775); actin and myosin identified in onion bulbs by immunochemical methods (*Zhiwu Xuebao* 1989, *31*, 780; *Chem. Abstr.* 1990, *113*, 37727 v); phytoalexins - tsibulin 1 and tsibulin 2 - isolated and their structures determined (*Dokl. Acad. Nauk Ukr. SSR.* Ser. B 1989, 65; *Chem. Abstr.* 1990, *112*, 175547 s; *Phytochemistry* 1991, *30*, 799); kaempferol-3-O-sophorosido-7-O-glucuronide and quercetin-3-O-sophorosido-7-O-glucuronide isolated (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1991, 33rd, 541; *Chem. Abstr.* 1992, *116*, 170202 y; *Tetrahedron Lett.* 1992, *33*, 1213); cyanidin-3-glucoside, cyanidin-3-malonylglucoside, cyanidin-3-laminaribioside and cyanidin-3-malonyllaminaribioside isolated from red onion (*Biosci., Biotechnol., Biochem.* 1994, *58*, 1324; *Chem. Abstr.* 1994, *121*, 129994 y).

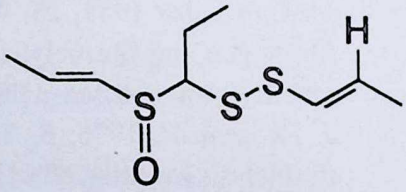
NEW COMPOUNDS



I
R = Me, R` = CH=CHMe (cis & trans)
II
R = Pr, R` = CH=CHMe (cis & trans)
III
R,R` = Pr



IV



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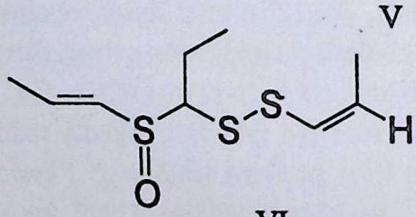
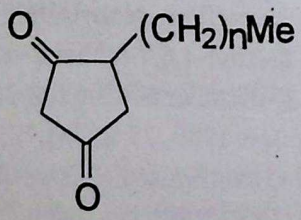
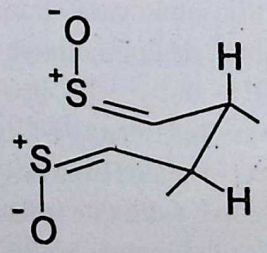


VI



Tsibulin 1
n = 7
Tsibulin 2
n = 5



2,3-Dimethyl-1,4-butanedithial-1,4-dioxide

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BIOLOGICAL ACTIVITY

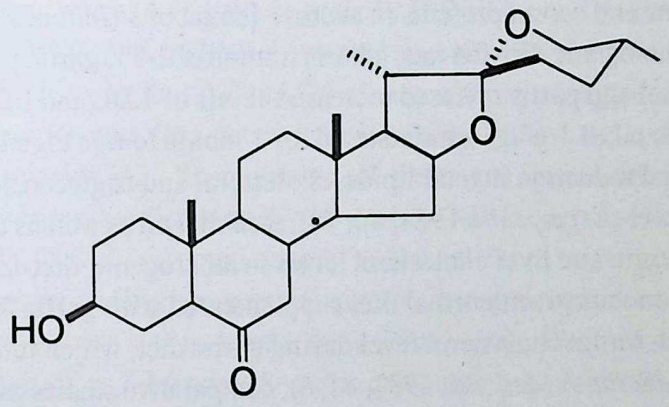
Diphenylamine (10.0 mg/kg, p.o.) in rabbits caused after 2 hr 61.4% reduction in blood sugar as compared to tolbutamide (50.0 mg/kg) which caused 44.1% reduction under same conditions (*J. Nat. Prod.* 1984, *47*, 775); thiosulphinates I, II and III exhibited antiasthmatic activity *in vivo*; both thiosulphinates and α-sulphinyl disulphides IV,V,VI inhibited cyclooxygenase and 5-lipoxygenase *in vitro (Phytochemistry* 1989, *28*, 2373); (Z,Z)2,3-dimethyl-1,4-butanedithial-1,4-dioxide showed *in vitro* inhibition of 5-lipoxygenase (*J. Am. Chem. Soc.* 1990, *112*, 4584); tsibulins 1 and 2 showed antifungal activity (*Phytochemistry* 1991, *30*, 799).

A. chinense G.Don syn. *A. bakeri* Regel (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 34).

Tuber extract showed antitumor activity.

A steroid - laxogenin - isolated and characterised (*Kyoto-furitsu Ika Daigaku Zasshi* 1990, *99*, 1159; *Chem. Abstr.* 1991, *114*, 135660 h).

NEW COMPOUNDS



Laxogenin

A. clarkei Hook.f.; see *A. tuberosum* Rottl. ex Spreng.

A. odorum L.; see *A. tuberosum* Rottl. ex Spreng.

A. porrum L. syn. *A. ampeloprasum* sensu Hook.f. (non L.), *A. ampeloprasum* L. var. *porrum* (L.) Regel (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 34).

Thiosulphinates - MeS(O)SMe, MeS(O)SPr, PrS(O)SPr, cis- and trans-propyl-sulphinothioic acid-S-propyl esters - and cis- and trans-2,3-dimethyl-5,6-dithiabicyclo-[2.1.1]hexane-5-oxides identified by GC-MS (*J. Agric. Food Chem.* 1992, *40*, 2431; *Chem. Abstr.* 1992, *117*, 250064 r).

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BIOLOGICAL ACTIVITY

A peptide isolated which strongly inhibited platelet aggregation induced by collagen or ADP (*Biochem. Int.* 1992, *28*, 373; *Chem. Abstr.* 1993, *118*, 35962 x).

A. sativum L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 35).

Aqueous homogenate of clove showed antibacterial and antifungal activities *in vitro* (*Phytother. Res.* 1991, *5*, 154; *Chem. Abstr.* 1991, *115*, 247549 f); garlic significantly counteracted coagulability-enhancing and fibrinolysis-lowering effects of cholesterol feeding in rabbits but was less active as compared to clofibrate (*Indian Med. J.* 1982, *76*, 126); feeding of garlic oil prevented ethanol-induced rise of cholesterol and triglycerides in serum, rise of total lipids in liver and accumulation of cholesterol in kidney and liver in rabbits (*Indian J. Biochem. Biophys.* 1984, *21*, 211); in a 4-month study on experimental atherosclerosis in rabbits, essential oils of garlic and onion significantly reduced serum cholesterol and glycerides and reduced aortic atheroma (*Atherosclerosis* 1977, *26*, 379; *Artery* 1980, *7*, 428); administration of garlic extract significantly increased liver glycogen and significantly decreased fasting blood sugar, serum triglycerides and liver and serum proteins in sucrose-fed rabbits (*Indian J. Physiol. Pharmacol.* 1980, *24*, 151); in atherogenic diet-fed rats, administration of 2-3% garlic powder greatly lowered serum cholesterol level and partly reversed increased-levels of LDL and LDL-cholesterol (*Lipids* 1982, *17*, 483); garlic oil (0.1 g/kg) administered for 1 month to rats together with high fat-high cholesterol diet caused reduction in total lipids, cholesterol and triglycerides and restored serum albumin to normal level (*Experientia* 1984, *40*, 78); essential oil as well as defatted garlic powder caused lowering of serum and liver cholesterol levels in atherogenic diet-fed rats (*Indian J. Med. Res.* 1984, *79*, 580); rabbits given normal diet supplemented with garlic for 15-30 days showed significant increase in serum cholesterol level during garlic diet, which returned to normal after withdrawal of garlic (*Indian J. Med. Sci.* 1987, *41*, 6); comparative studies carried out on beneficial effects of garlic, onion and guggul on experimental hyperlipidaemia and atherosclerosis (*J. Postgraduate Med.*. 1991, *37*, 132); garlic powder (0.60 g) given daily for 3 months to 40 humans aged 70 and above, caused significant reduction in serum cholesterol, phospholipid and triglyceride concentrations in subjects, especially those with base line cholesterol above 5.2 mmol/l; lipid composition of plasma lipoproteins was also altered (*Brit. Med. J.* 1991, *303*, 785).

Aqueous garlic extract (2.0 ml/100 g, intragastric) significantly increased level of blood serum urea (6.27 vs. 4.1 mmol/l) and activity of blood serum aspartate aminotransferase (170 vs. 120 units) in rats as compared to control animals. Garlic oil (6.7 mg/100 g) given to fed rats did not affect blood serum urea or enzymes. However, in 24 hr fasted rats garlic oil significantly increased level of blood serum urea (9.4 mmol/l) and decreased blood serum alkaline phosphatase (15.5 vs. 376 units) (*Curr. Sci.* 1989, *58*, 1409); acetone extract showed antimutagenic activity against mutagens MNNG, aflatoxin B1, NaN_3 and 2-aminofluorene in Ames test (*Salmonella*

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typhimurium strains TA 98 and TA 100). It decreased mutagenic activity of aflatoxin B1 by 73.0-92.0% (*Zhonghua Yufang Yixue Zazhi* 1989, *23*, 160; *Chem. Abstr.* 1990, *112*, 53926 u); chloroform-soluble fraction possessed marked antimutagenic activity in *Salmonella typhimurium* TA100 and TA98. Of four fractions, designated as ASCF 1, ASCF 2, ASCF 3 and ASCF 4, obtained from chloroform-soluble fraction, ASCF 2 exhibited highest antimutagenic activity and methyl linoleate was identified as major component responsible for it (*Han'guk Yongyang Siklyong Hakhoechi* 1991, *20*, 253; *Chem. Abstr.* 1992, *116*, 67012 n); alcoholic extract inhibited in dose-dependent manner mutagenesis induced by aflatoxin B1 (AFB1) and MNNG in *Salmonella typhimurium* TA 100. Chloroform-soluble fraction of alcoholic extract exhibited strong antimutagenicity against AFB1 and also strongly inhibited growth of human HT-29 colon carcinoma cells (*Han'guk Sikp'um Kwahakhoechi* 1991, *23*, 370; *Chem. Abstr.* 1993, *119*, 47893 j).

Plant extract inhibited 5-lipoxygenase, cyclooxygenase, thrombocyte aggregation and angiotensin I-converting enzyme *in vitro* (*Planta Med.* 1992, *58*, 1); dialysate of garlic bulbs showed inhibition of cardiovascular functions in dogs *in vivo* and in isolated rat atria (*J. Ethnopharmacol.* 1992, *37*, 145).

Determination of alliin (4.9 mg/g) in garlic by HPLC (*Nara-Ken Eisei Kenkyusho Nenpo* 1988, 37; *Chem. Abstr.* 1990, *112*, 234061 d); steroid saponins (I and II) isolated (Jpn. 1,224,396 (1989) Sep. 07; *Chem. Abstr.* 1990, *112*, 125183 z); a new furostanol glycoside - sativoside B1 - isolated from bulbs and its structure determined; isolation of two new steroidal glycosides - sativoside R1 and sativoside R2 - from roots and their characterisation as 25(R)26-O-β-D-glucopyranosyl-22-hydroxy-5α-furostan-3β,26-diol-3-O-β-D-glucopyranosyl(1→3)-O-β-D-glucopyranosyl(1→2)-O-β-D-xylopyranosyl(1→3)-O-β-D-glucopyranosyl(1→4)-O-β-D-galactoside and its corresponding spirostanol glycoside respectively; protodesgalactotigonin, desgalactotigonin and F-gitonin also isolated (*Chem. Pharm. Bull.* 1989, *37*, 2741); allixin isolated from bulbs and characterised as 3-hydroxy-5-methoxy-6-methyl-2-pentyl-4H-pyran-4-one (*Chem. Pharm. Bull.* 1989, *37*, 1656; Jpn. 02,311,462 (1990) Dec. 27; *Chem. Abstr.* 1991, *115*, 35703 b); methyl-2-propenyl thioether, di(2-propenyl) thioether and 1,2-dithiocyclopent-3-ene identified in volatile oil by GC-MS (*Fenxi Ceshi Tongbao* 1990, *9*, 11; *Chem. Abstr.* 1991, *114*, 22600 v); isolation of a pectic substance composed of glucose (78.63), galacturonic acid (38.4), mannose (7.64) and arabinose (2.41%) (*Bull. Pharm. Sci., Assiut Univ.* 1990, *13*, 1; *Chem. Abstr.* 1991, *115*, 203270 d); a Se-containing polysaccharide (Se-GPS) isolated (*J. Chin. Pharm. Sci.* 1992, *1*, 28; *Chem. Abstr.* 1993, *118*, 77092 u); palmitic, stearic, oleic, linoleic and linolenic acids, lysolecithin, lecithin, phosphatidylinositol, phosphatidylserine and phosphatidylethanolamine identified in oil, β-sitosterol predominant in unsaponifiable matter (*Bangladesh J. Sci. Ind. Res.* 1991, *26*, 41; *Chem. Abstr.* 1992, *117*, 169765 y); identification of diallyl disulphide, propylallyl disulphide, diallyl trisulphide, methylallyl trisulphide, 2-vinyl-4H-1,3-dithiin, isobutyl-isothiocyanate and 3-vinyl-4H-1,2-dithiin in garlic oil by GC (*Zhongguo Nongye Huaxue Huizhi* 1992, *30*, 14; *Chem. Abstr.* 1992, *117*, 130135 t).

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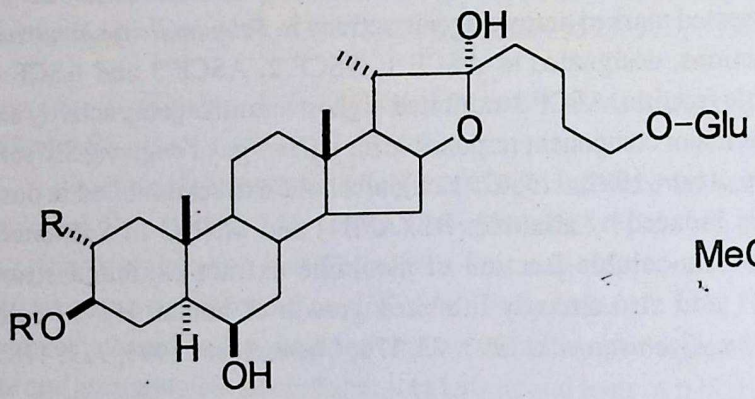
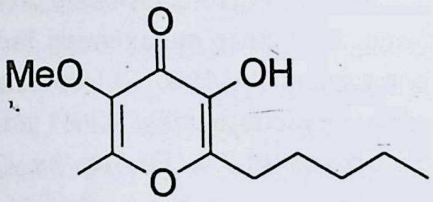
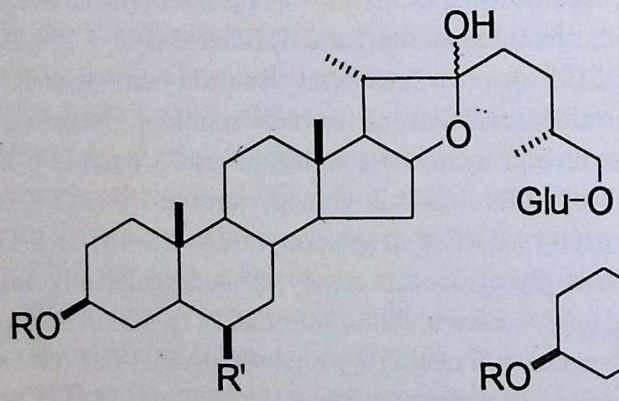
NEW COMPOUNDS

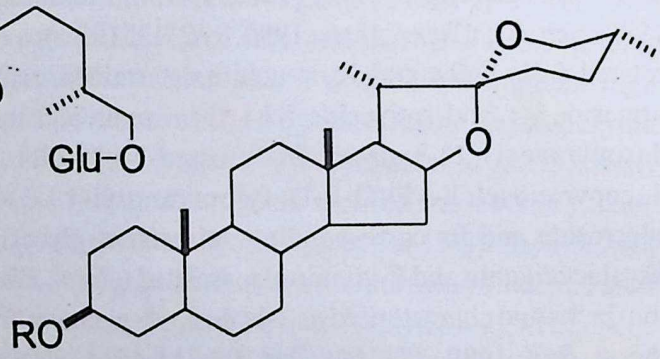




Allixin

I
R = H, R' = Glu(2→1)Glu(3→1)Glu(3→1)Glu(4→1)Gal
II
R = OH, R' = Glu(4→1)Gal





Sativoside B1
R = X-Glu, R' = OH
Sativoside R1
R = X-Xyl, R' = H

Sativoside R2
R = X-Xyl

X = Gal(4→1)Glu[(2→1)Glu(3→1)Glu](3→1)

BIOLOGICAL ACTIVITY

Steroidal saponin II showed MIC of 100.0 μg/ml against *Candida albicans* (Jpn. 1,224,396 (1989) Sep. 07; *Chem. Abstr.* 1990, *112,* 125183 z); transdermal application of allixin to mice remarkably inhibited tumor induced by DMBA and 12-O-tetradecanoylphorbol-13-acetate (Jpn. 2,311,462 (1990) Dec. 27; *Chem. Abstr.* 1991, *115*, 35702 b); polysaccharide Se-GPS inhibited human cytomegalovirus as shown by plaque reduction assay (*J. Chin. Pharm. Sci.* 1992, *1*, 28; *Chem. Abstr.* 1993, *118*, 77092 u); allixin showed weak antimicrobial activity (*Chem. Pharm. Bull.* 1989, *37*, 1656); allixin inhibited enhanced phospholipid metabolism of cultured

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cells induced by tumor promotor, 12-O-tetradecanoylphorbol-13-acetate (TPA). Further, it suppressed tumor promoting stage of carcinogenesis *in vivo* with TPA in skin tumor formation initiated by 7,12-dimethylbenz(a)- anthracene in mice. Since, it has no side-effects it may be useful in prevention of human cancer (*Cancer J.* 1990, *3*, 20; *Chem. Abstr.* 1990, *112*, 191529 t). Allicin is a specific inhibitor and inhibited bacterial acetyl-CoA forming system (*FEBS Lett.* 1990, *261*, 106; *Chem. Abstr.* 1990, *112*, 151334 u).

Ajoene inactivated human gastric lipase which is involved in digestion and absorption of dietary fats (*Biochem. Biophys. Acta* 1989, *137*, 1006; *Chem. Abstr.* 1990, *112*, 498 z); cytotoxicity of ajoene was tested using human primary fibroblasts, a permanent non-tumorgenic cell line derived from baby hamster kidney cells and a tumorgenic lymphoid cell line derived from Burkitt lymphoma (BJA-b) and found to be 2.0-50.0 μg/ml; ED50 values revealed that tumorgenic BJA-b cells were most sensitive (*Cancer Lett.* 1990, *53*, 103; *Chem. Abstr.* 1991, *114*, 283 s); S-allylcysteine sulphoxide showed significant antidiabetic effect in alloxan-diabetic rats. It decreased significantly concentrations of serum lipids and blood glucose and activated serum enzymes (alkaline phosphatase, acid phosphatase and lactate dehydrogenase) and liver glucose-6-phosphatase at a dose of 0.2 g/kg. It increased significantly liver and intestinal HMG CoA reductase and liver haemokinase activities (*Indian J. Exp. Biol.* 1992, *30*, 523); *in vitro* virucidal effect of fresh garlic extract, its polar fraction and allicin, allylmethyl thiosulphinate, ajoene, alliin, diallyl disulphide and diallyl trisulphide was determined against herpes simplex virus type 1, type 2, parainfluenza virus type 3, vaccinia virus, vesicular stomatitis virus and human rhinovirus type 2. Order of virucidal activity was : ajoene > allicin > allylmethyl thiosulphinate. No activity found in garlic polar fraction, alliin, diallyl disulphide and diallyl trisulphide. Fresh garlic extract was virucidal and the predominant thiosulphinate in fresh garlic extract was allicin (*Planta Med.* 1992, *58*, 417); garlic oil and allylmethyl trisulphide inhibited platelet aggregation induced by most agonists except arachidonic acid metabolites. They inhibited production of thromboxane B2, 12S-hydroxy-5,8,10-heptadecatrienoic acid, prostaglandin E2 and 12-hydroxyeicosatetraenoic acid (*ACS Symp. Ser.* 1994, 128; *Chem. Abstr.* 1994, *120*, 162104 k).

A. schoenoprasum L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 32)

Thiosulphinates - MeS(O)SMe, MeS(O)SPr, PrS(O)SPr, cis- and trans-propyl-sulphinothioic acid-S-propyl esters - and cis- and trans-2,3-dimethyl-5,6-dithiabicyclo[2.1.1]-hexane-5-oxides identified by GC-MS (*J. Agric. Food Chem.* 1992, *40*, 2431; *Chem. Abstr.* 1992, *117*, 250064 r).

A. tuberosum Rottl. ex Spreng. syn. *A. tuberosum* Roxb., *A. clarkei* Hook.f., *A. odorum* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 36).

Hexadecanoic acid, dimethyl sulphide, 1,3-dithiane, 2-methyl-1,3-oxathiane and 2,4-dimethylthiophene isolated from aerial parts (*Zhongguo Yaoxue Zazhi* 1991, *26*, 648; *Chem.*

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Abstr. 1992, *117*, 86672 q); cis- and trans-methylsulphinothioic acid-S-1-propenyl esters identified by GC-MS (*J. Agric. Food Chem.* 1992, *40*, 2431; *Chem. Abstr.* 1992, *117*, 250064 r).

A. tuberosum Roxb.; see *A. tuberosum* Rottl. ex Spreng.

ALOCASIA (Araceae)

A. indica (Lour.) Spach; see *A. macrorhiza* (L.) G.Don

A. macrorhiza (L.) G.Don syn. *A. indica* (Lour.) Spach (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p.12).

Plant contained HCN (0.0027%) (*Sci. Int.* 1990, *2*, 311; *Chem. Abstr.* 1992, *116*, 124847 q).

ALOE (Liliaceae)

A. barbadensis Mill.; see *A. vera* (L.) Burm.f.

A. vera (L.) Burm.f. syn. *A. barbadensis* Mill. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p.32).

A polysaccharide isolated from leaf parenchyma gel (*Planta Med.* 1989, *55*, 509); isolation of β-sitosterol from leaves (*Kenkyu Kiyo-Tokyo Kasei Daigaku* 1990, *30*, 15; *Chem. Abstr.* 1990, *113*, 148952 j).

BIOLOGICAL ACTIVITY

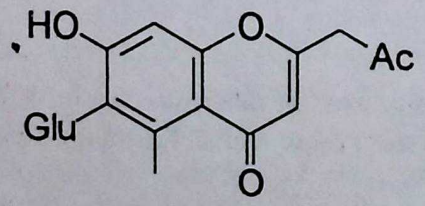
Polysaccharide inhibited opsonization of zymosan in human serum and displayed adjuvant activity on specific antibody production and induction of delayed-type hypersensitivity in mice (*Planta Med.* 1989, *55*, 509); supernatant of gel showed cytotoxicity against C3HIOT1/2 cells at initiation stage of transformation (*Biosci., Biotechnol., Biochem.* 1993, *57*, 1350; *Chem. Abstr.* 1993, *119*, 278474 q).

A. vera (L.) Burm.f. var. *chinensis* (Haw.) Berge.

Isolation and structure elucidation of isoaloesin from leaves along with aloesin (*Zhongguo Zhongyao Zazhi* 1993, *18*, 609; *Chem. Abstr.* 1994, *120*, 101981 x).

Distribution : Central and peninsular India.

NEW COMPOUNDS



Isoaloesin

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ALPINIA (Zingiberaceae)

A. galanga Willd. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 36).

Galanolactone synthesised (*Tetrahedron Lett.* 1989, *30*, 553); myrcene (94.51 and 52.34%) determined in rhizome and leaf essential oil respectively (*J. Essent. Oil Res.* 1992, *4*, 81; *Chem. Abstr.* 1993, *118*, 154117 k).

ALSTONIA (Apocynaceae)

A. macrophylla G.Don (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 38).

Alstonisine and quebrachidine isolated from bark (*Fitoterapia* 1990, *61*, 91); a new dihydroindole alkaloid - alstozine N-oxide - isolated and its structure elucidated (*Fitoterapia* 1990, *61*, 230); isolation of alstonerine, alstophylline, yohimbine and β-yohimbine from fruits (*Fitoterapia* 1990, *61*, 377); isolation and structure elucidation of a new oxindole alkaloid - macroxine - from leaves (*Tetrahedron* 1991, *47*, 3129); three new indole alkaloids - alstonamide, demethoxyalstonamide and alstoumerine - isolated from leaves and their structures established (*J. Nat. Prod.* 1991, *54*, 750); N4-oxides of cathafoline and 11-methoxyakuammicine, vincamajine-17-O-veratrate and vincamazine N1-tri-O-methylgallate isolated from leaves of plant from Thailand (*Phytochemistry* 1994, *35*, 249); five new alkaloids - alstolagumine (11-methoxy-19,20α-epoxyakuammicine), lagumidine (11-methoxy-19-oxo-20α-hydroxyakuammicine), 10-methoxy-N1-methyleburnamine-17-O-benzoate (I), 10-methoxy-N1-methyleburnamine-17-O-veratrate (II) and 5α,10,11-trimethoxystrictamine (III) - isolated from leaves and their structures established; dimethoxypicrinine, quaternine, strictamine and cathafoline also isolated (*Phytochemistry* 1994, *35*, 253); enantiospecific synthesis of (-)alstonerine and partial synthesis of (+)villalstonine (*J. Am. Chem. Soc.* 1994, *116*, 9027),

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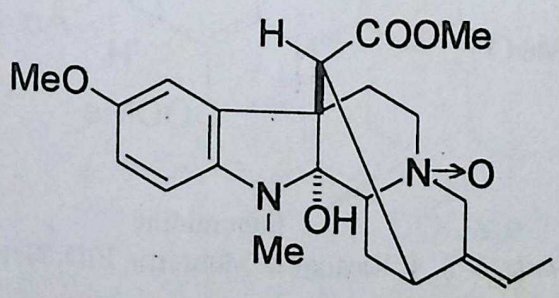
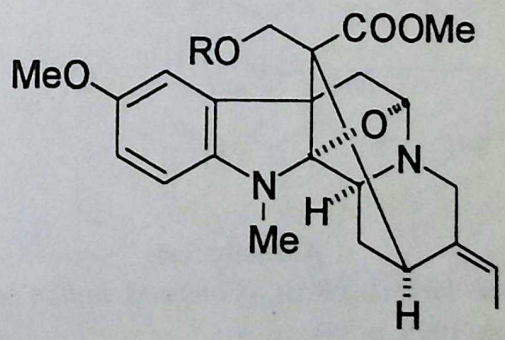


Alstozine N-oxide



I
R = Benzoyl
II
R = Veratroyl

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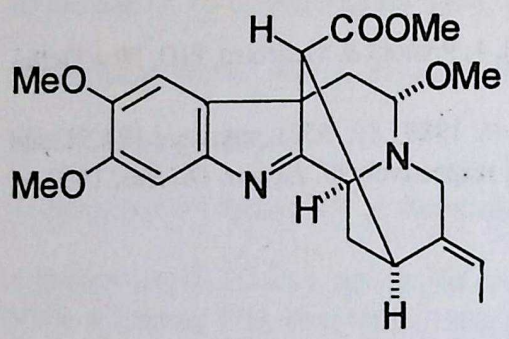
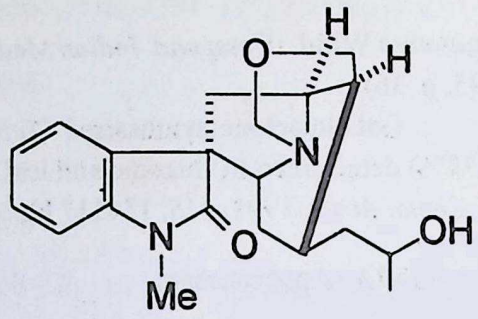
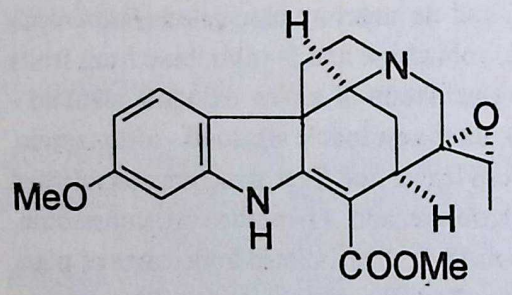


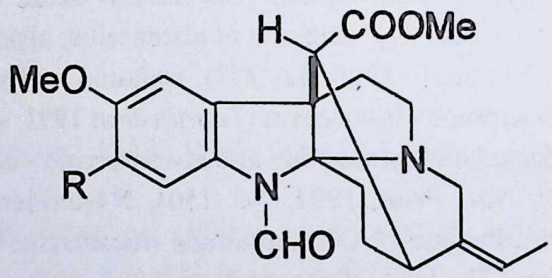
III



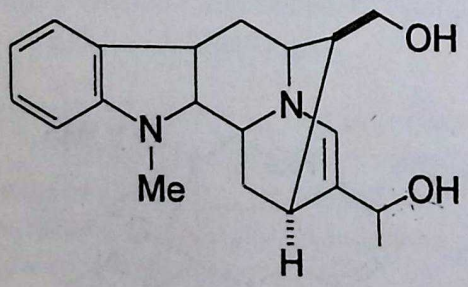
Macroxine



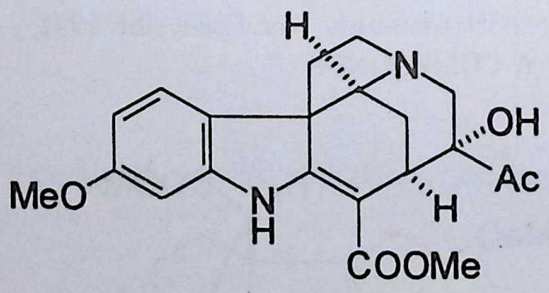
Alstolagumine



Alstonamide
R = OMe
Demethoxyalstonamide
R = H



Alstoumerine



Lagumidine

A. scholaris (L.) R.Br. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 39).

Isolation of alschomine and isoalschomine from Taiwanese and Thai plants, picrinine, picralinal, nareline, 6,7-secoalstonamine, N-demethyl-6,7-secoalstonamine and 19-hydroxytubotaiwine from Philippine plant and vallesamine, 6,7-secoalstonamine as major alkaloids along with pseudoakuammigine, picraline and N^a-methyl eburnamine from Indonesian plant

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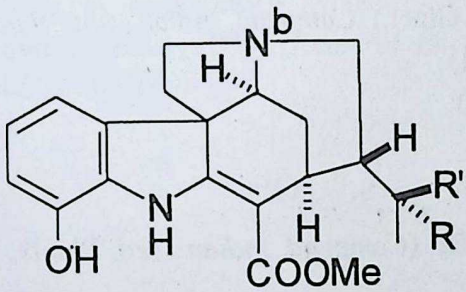
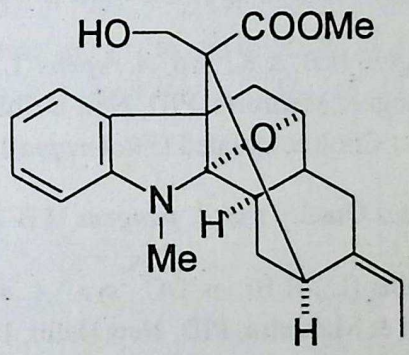
(*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1989, 31st, 570; *Chem. Abstr.* 1990, *112*, 195196 g); three new alkaloids - lagunamine (19-hydroxytubotaiwine), angustilobine B acid and losbanine (6,7-seco-6-nor-angustilobine B) - isolated from leaves of Philippine plant and their structures determined; tubotaiwine, its oxide and 6,7-secoangustilobine B also isolated; 17-O-acetylechitamine and echitamine isolated from bark (*Phytochemistry* 1990, *29*, 3321); isolation and structure elucidation of new alkaloids - 19-epischolaricine, N^b-methylscholaricine, N^a-methyl eburnamine and vallesamine N^b-oxide from the leaves of plants from Taiwan, Thailand, Indonesia and Philippines; leaves of Taiwanese and Thai plants showed similar composition of alkaloids with picrinine, nareline and alschomine as major constituents; picraline and its homologs obtained from leaves of Indonesian plant (*Phytochemistry* 1990, *29*, 3547); enantioselective total synthesis of (+)tetrahydroalstonine (*Tetrahedron Lett.* 1990, *31*, 2705); lupeol acetate and β-sitosterol isolated from bark (*Bangladesh J. Sci. Ind. Res.* 1991, *26*, 1; *Chem. Abstr.* 1992, *117*, 167663 q).

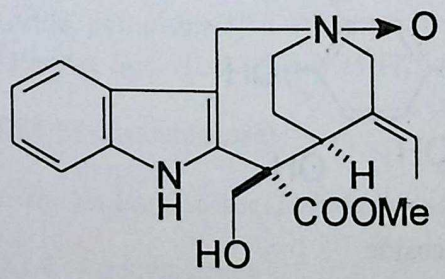
NEW COMPOUNDS



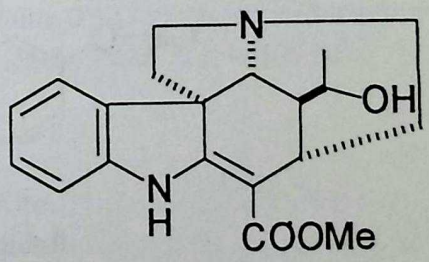
19-Epischolaricine
R = OH, R' = H
N^b-Methylscholaricine
R = H, R' = OH, N^b-Me



N^a-Methyleburnamine



Vallesamine N^b-oxide



19-Hydroxytubotaiwine

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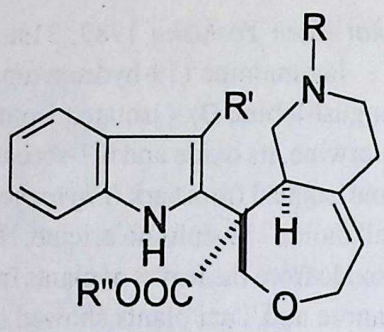

Angustilobine B acid
R R' = -CH_2-, R" = H
6,7-Seco-6-nor-angustilobine
R,R' = H, R" = Me

ALTERNANTHERA (Amaranthaceae)

A. nodiflora R.Br.; see *A. sessilis* (L.) R.Br. ex DC.

A. pungens H.B. & K. syn. *A. repens* (L.) Link (non Gmel.) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrorta, PID, New Delhi, 1995, p.41).

Choline isolated (*Fitoterapia* 1993, *64*, 95).

A. repens Gmel.; see *A. pungens* H.B. & K.

A. sessilis (L.) R.Br. ex DC. syn. *A. nodiflora* R.Br. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.41).

Isolation of 3β-O-(β-D-glucopyranosyluronic acid)-28-O-β-D-glucopyranosyl oleanolic acid from leaves (*Bull. Soc. Chim. Belg.* 1992, *101*, 227; *Chem. Abstr.* 1992, *117*, 23287 x); a new flavone glycoside - robinetin-7-O-β-glucopyranoside - isolated from leaves and its structure elucidated (*Asian J. Chem.* 1993, *5*, 1148; *Chem. Abstr.* 1994, *120*, 265763 d).

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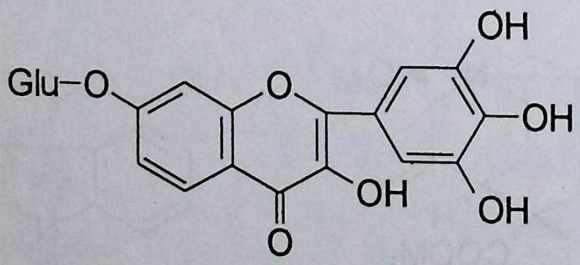

Robinetin-7-O-glucoside

ALTHAEA (Malvaceae)

A. broussonetiifolia Iljin

Dehydrokaempferol-4'-O-glucoside, isoquercitrin, hypoletin-8-O-gentiobioside,

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astragalin and tiliroside identified in leaves and flower extract by HPLC (*Acta Pol. Pharm.* 1991, *48*, 59; *Chem. Abstr.* 1993, *118*, 187802 h).
Distribution: Kashmir.

A. officinalis L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 41).

Determination of flavonoid aglycones in leaves (0.68-1.39), in flowers (0.32-0.35) and in roots (0.14-0.24%); tiliroside obtained from leaves (0.13-0.25) and flowers (0.15-0.19%); hypoletin-8-gentiobioside (0.25-0.42%) from leaves; flower contained dihydrokaempferol-4-glucoside (0.76-0.84%); plant collected before flowering had the highest content of flavonoids (*Farm. Pol.* 1990, *46*, 153; *Chem. Abstr.* 1991, *115*, 89137 p); isolation of caffeic, p-hydroxybenzoic, ferulic, p-coumaric, vanillic and chlorogenic acids, quercetin-3-glucoside, astragalin and populnin from flowers (*Fitoterapia* 1990, *61*, 280); a new flavonoid sulphate - isoscutellarein-4'-methyl ether-8-(2"-SO_3K) glucoside (I) - isolated from roots and its structure elucidated; hypoletin-8-glucoside also isolated (*Planta Med.* 1991, *57*, 284); dihydrokaempferol-4'-O-glucoside, isoquercitrin, hypoletin-8-O-gentiobioside, astragalin and tiliroside identified in leaves and flowers by HPLC (*Acta Pol. Pharm.* 1991, *48*, 59; *Chem. Abstr.* 1993, *118*, 187802h).
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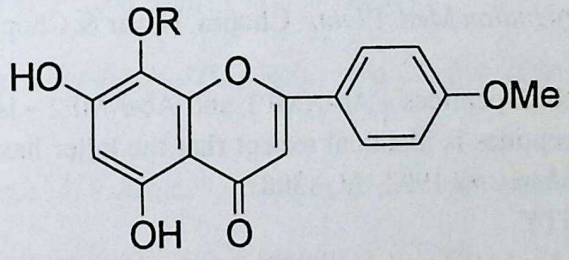

I
R = Glu(2"-SO_3K)

A. rosea (L.) Cav. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 41).

Cyanidin-3,7-di-β-D-glucoside, cyanidin-3β-D-glucoxyloside, delphinidin-3β-D-galactoside, petunidin-3β-D-rhamnoside and pelargonidin-7β-D-glucoside isolated from petals (*Bull. Pharm. Sci., Assiut Univ.* 1988, *11*, 185; *Chem. Abstr.* 1990, *112*, 95509 r).

ALYSSUM (Brassicaceae)

A. maritimum Lamk.; see *Lobularia maritima* (L.) Desv.

ALYXIA (Apocynaceae)

A. reinwardtii Blume var. *reinwardtii* syn. *A. stellata* sensu Hook.f. (non Roem. & Schult.) (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 14).

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Isolation and structure determination of two iridolactones - alyxialactone and 4-epi-alyxialactone - from leaves (*Phytochemistry* 1990, *29*, 3197).

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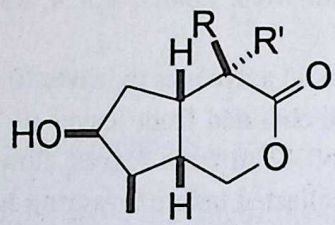

Alyxialactone
R = H, R' = CH_2OH
4-Epi-alyxialactone
R = CH_2OH, R' = H

A. stellata Roem. & Schult.; see *A. reinwardtii* Blume var. *reinwardtii*

AMARANTHUS (Amaranthaceae)

A. caudatus L. (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 15).

Two antimicrobial peptides - Ac-AMP1 and Ac-AMP2 - isolated from seeds; amino acid sequence of both peptides is identical except that the latter has one additional residue at carboxyl terminus (*Biochemistry* 1992, *31*, 4308).

BIOLOGICAL ACTIVITY

Both peptides, Ac-AMP1 and Ac-AMP2, bind to chitin reversibly and inhibit growth of various fungi pathogenic to plants at doses much lower than those of known antifungal chitin-binding proteins. They were also active against Gram +ve bacteria (*Biochemistry* 1992, *31*, 4308).

Note : *A. caudatus* L. and *A. paniculatus* L., two distinct species, are wrongly treated as synonyms in *Glossary*.

A. cruentus L.; see *A. hybridus* L. ssp. *cruentus* (L.)Thell.

A. hybridus L. ssp. *cruentus* (L.)Thell. syn. *A. paniculatus* sensu Hook.f. p.p. (non L.), *A. cruentus* L.

H. - Chuamarsa, Ganhar, Kalgaghasa; Beng. - Bathus, Chuko; Guj. - Rajagaro; Kan. - Kirae soppu, Raajana, Rajakere; Mar. - Rajgira; Sans. - Rahadri, Rajagiri, Rajashkini; Tam. - Kaninee, Mulaikeerai, Pungikeerai; Bom. - Kahola bhaji; Kash. - Bustanafroz.

Aerial part, foliage and inflorescence contained 0.35, 0.43 and 0.53% rutin respectively (*Rastit. Resur.* 1992, *28*, 63; *Chem. Abstr.* 1993, *118*, 230166 t); determination of linoleic (43.9), oleic (21.9), palmitic (19.4), vernolic (7.8), stearic (3.9), sterculic (1.6) and malvalic (1.5%)

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acids in seed oil (*J. Sci. Food Agric.* 1992, *58*, 139; *Chem. Abstr.* 1992, *116*, 191094 e); phospholipid (5.0) and glycolipid (2.6%) obtained from seed oil of Mexican plant, the major polar lipid being phosphatidylcholine; α-tocopherol (14.7), β-tocopherol (43.0), γ-tocopherol (6.2) and δ-tocopherol (36.1%) determined in tocopherol fraction (*Ciencia* 1992, *43*, 113; *Chem. Abstr.* 1993, *118*, 190347 u); starch from seeds characterised as α-, β- and γ-amylases (*Chem. Pap.* 1994, *48*, 58; *Chem. Abstr.* 1994, *121*, 106852 m).
Distribution: Grown as leafy vegetable almost throughout India upto 2400 m.

A. hybridus L. ssp. *hybridus* var. *erythrostachys* Moq. syn. *A. hybridus* L. var. *hypochondriacus* (L.) Rob., *A. hypochondriacus* L. (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 15).

Four triterpenoid saponins isolated and characterised as 3-O-α-L-rhamnopyranosyl(1→3)-β-D-glucuronopyranosyl-2β,3β-dihydroxyolean-12-en-28-oic acid-28-O-β-D-glucopyranosyl ester; 3-O-α-L-rhamnopyranosyl(1→3)-β-D-glucuronopyranosyl-2β,3β-dihydroxyolean-12-en-23-al-28-oic acid-28-O-β-D-glucopyranosyl ester; 3-O-α-L-rhamnopyranosyl(1→3)-β-D-glucuronopyranosyl-2β,3β-dihydroxy-30-norolean-12,20(29)-dien-28-oic acid-28-O-β-D-glucopyranosyl ester and 3-O-α-L-rhamnopyranosyl(1→3)-β-D-glucurono-pyranosyl-2β,3β-dihydroxy-30-norolean-12,20(29)-dien-23-al-28-oic acid-28-O-β-D glucopyranosyl ester (*Chem. Pharm. Bull.* 1991, *39*, 2609).

A. hybridus L. var. *hypochondriacus* (L.) Rob.; see *A. hybridus* L. ssp. *hybridus* var. *erythrostachys* Moq.

A. hypochondriacus L.; see *A. hybridus* L. ssp. *hybridus* var. *erythrostachys* Moq.

A. paniculatus L.; see *A. hybridus* L. ssp. *cruentus* (L.) Thell.

A. viridis L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 42).

Total fatty acids from leaves contain palmitic acid (77.8%) (*Pakistan J. Sci. Ind. Res.* 1989, *32*, 726; *Chem. Abstr.* 1991, *114*, 3392 n).

AMBERBOA (Asteraceae)

A. divaricata (DC.) Kuntze; see *A. ramosa* (Roxb.) Jafri

A. ramosa (Roxb.) Jafri syn. *Oligochaeta ramosa* (Roxb.) Wagenitz, *Amberboa divaricata* (DC.) Kuntze, *Volutarella divaricata* Benth. & Hook.f., p.p., *Tricholepis procumbens* Wt. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 43).

Two new triterpenes - 22(R)cycloart-25-ene-3β-22-diol and cycloart-20-en-3β,25-diol - isolated along with cycloartanol and cycloart-23-ene-3β,25-diol (*J. Nat. Prod.* 1993, *56*, 295).

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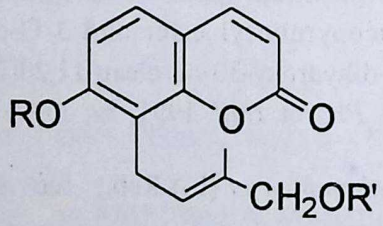
AMMI (Apiaceae)

A. majus L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 38).

Isolation of komalin and isooxyimperatorin from fruits (*Egypt. J. Pharm. Sci.* 1991, *32*, 389; *Chem. Abstr.* 1992, *117*, 248541 a); methyl 6-(β-glucopyranosyloxy)-7-methoxy-5-benzofuranpropanoate and 1-(2,3-dihydroxyphenyl)-3-[4-(β-D-glucopyranosyloxy)phenyl]-2-propen-1-one isolated from fruits (*Nat. Prod. Lett.* 1993, *3*, 209; *Chem. Abstr.* 1994, *121*, 251187 c); a new coumarin - isoarnottinin - and its two new glycosides - isoarnottinin-7-O-glucoside and isoarnottinin-4'-O-glucoside - isolated from fruits and their structures determined; scopoletin, 8-(2"-acetoxy-3"-hydroxy-3"-methylbutoxy)psoralen, 8-hydroxy-5-methoxypsoralen, apiumetin, dihydroxanthyletin, lomatin, ammirol, oleanolic acid and mannitol also isolated (*Phytochemistry* 1993, *34*, 819).

NEW COMPOUNDS



Isoarnottinin
R,R' = H
Isoarnottinin-7-O-glucoside
R = Glu, R' = H
Isoarnottinin-4'-O-glucoside
R = H, R' = Glu

BIOLOGICAL ACTIVITY

Khellin inhibited noradrenaline and high K^+-induced contractions in rat isolated aorta. At high dose (0.32 mM) it increased cAMP levels and reduced Ca^{2+} influx in resting tissues and in tissues stimulated by noradrenaline and high K^+. It is concluded that khellin caused non-specific inhibition of Ca^{2+} influx and may also exhibit intracellular actions, thus decreasing availability of Ca^{2+} required for activation in isolated aorta of rat (*J. Pharm. Pharmacol.* 1991, *43*, 46).

A. visnaga (L.) Lam. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 44).

4-Norvisnagin, khellinol, rhamnazin, visamminol, isorhamnetin, khellin, visnagin, ammiol and khellol isolated from dried fruits (*Planta Med.* 1990, *56*, 134).

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AMOMUM (AMMOMUM) (Zingiberaceae)

A. compactum Roem. & Schult.; see *Elettaria cardamomum* (L.) Maton

A. xanthioides Wall. ex Baker (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 45).

α-Pinene, camphene, (+)limonene, linalool, camphor, (+)borneol, nerolidol and 3-phenyl-2-butanone identified in essential oil by GC-MS (*Tap Chi Duoc Hoc* 1990, 17; *Chem. Abstr.* 1991, *115*, 239284 a).

AMPHILOPHIS (Poaceae)

A. odorata A. Camus; see *Bothriochloa pladhii* (Retz.) S.T. Blake

AMYGDALUS (Rosaceae)

A. communis L.; see *Prunus dulcis* (Mill.) D.A. Webb

ANACARDIUM (Anacardiaceae)

A. occidentale L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 45).

Fruits inhibited tyrosinase activity (*J. Nat. Prod.* 1994, *57*, 545).

BIOLOGICAL ACTIVITY

Cardol showed pronounced antifilarial activity; hydroxyl groups and alkyl side chain were found to be necessary for activity. While carbamazine was active at 350 ppm (LC100), cardol showed activity at low concentration of 3.5 ppm (LC 100). Cardol given orally to rats was tolerated upto 5.0 g/kg (*Curr. Sci.* 1990, *59*, 477); anacardic acid, cardol and methyl cardol exhibited moderate cytotoxic activity against both BT-20 breast and HeLa epithelial cervix carcinoma cells (*J. Agric. Food Chem.* 1993, *41*, 1012; *Chem. Abstr.* 1993, *119*, 277 w); anacardic acid and cardol exhibited characteristic competitive inhibition of oxidation of L-3,4-dihydroxyphenylalanine by mushroom tyrosinase (*J. Nat. Prod.* 1994, *57*, 545).

ANAGALLIS (Primulaceae)

A. arvensis L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 46).

Isolation of α-spinasterol, avenasterol-7-ene, dihydrospinasterol, β-sitosterol, stigmasterol and palmitic, stearic, oleic, linoleic and linolenic acids from leaves (*Indian Drugs* 1991, *28*, 527); four new triterpenoid oligoglycosides isolated from aerial parts and characterised as anagalligenin B-3-O-[β-D-xylosyl(1→2)-β-D-glucosyl(1→4)-[β-D-glucosyl(1→4)-β-D-glucosyl(1→2)]-α-L-arabinopyranoside] (I), anagalligenone-3-O-β-D-xylosyl(1→2)-β-D-

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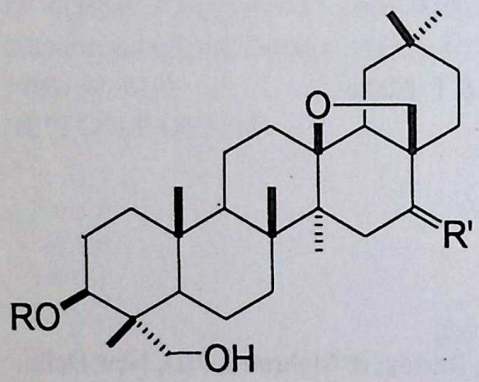
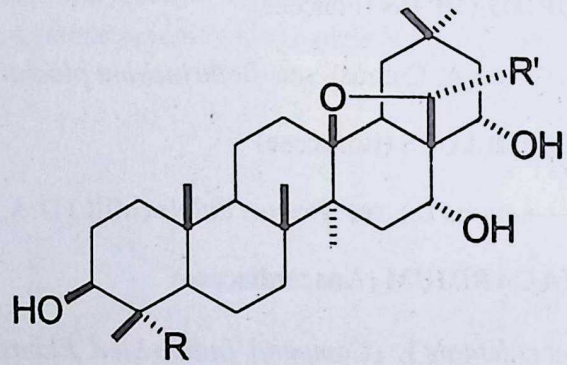
glucosyl(1→4)[β-D-glucosyl(1→4)-β-D-glucosyl(1→2)]-α-L-arabinopyranoside (II), anagalligenone-3-O-(β-D-xylosyl(1→2)-β-D-glucosyl(1→4)[-β-D-glucosyl (1→2)]-α-L-arabinopyranoside (III) and anagalligenin B-3-O-(β-D-glucosyl(1→2) [β-D-glucosyl(1→4)]-α-L-arabinopyranoside (IV); anagallisins A, B, D and E also isolated (*Tetrahedron* 1991, *47*, 5215); an oleanane triterpene metabolite (V) isolated and its structure determined (*Phytochemistry* 1992, *31*, 929); isolation and structure elucidation of two new oleanane triterpene metabolites (VI and VII) from lipid extract (*Phytochemistry* 1992, *31*, 3965).

NEW COMPOUNDS





I
R = X, R' = α-OH,H
II
R = X, R' = O
III
R = Y-(2→1)Xyl, R' = O
IV
R = Y, R' = α-OH,H

V
R = Me, R' = OH
VI
R = CH_2OH, R' = OH
VII
R = CH_2OH, R' = H

X = Ara[(2→1)Glu(4→1)Glu](4→1)Glu(2→1)Xyl
Y = Ara[(2→1)Glu](4→1)Glu

ANAMIRTA (Menispermaceae)

A. cocculus (L.) Wt. & Arn. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 39).

Methyl picrotoxate isolated from berries and its stereostructure elucidated (*Indian J. Chem.* 1990, *29*B, 676); isolation of oxypalmatine, stepharine and (-)8-oxotetrahydropalmatine (*J. Natl. Sci. Counc. Sri Lanka* 1992, *20*, 187; *Chem. Abstr.* 1993, *119*, 156241 r); a new triterpenoid - 2α,3β,23-trihydroxy-11α,12α-epoxyolean-28,13β-olide (I) - and two new triterpenoid glycosides - β-D-glucopyranosyl-2β,3β,23-trihydroxyolean-12-en-28-oate and 2α,3β-dihydroxy-23β-D-glucopyranosyloxyolean-12-en-28-oic acid - isolated from stem; arjunolic acid and its 28-O-β-D-glucoside also isolated (*Phytochemistry* 1993, *34*, 1111).

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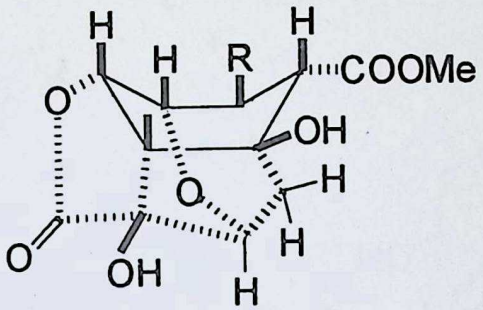
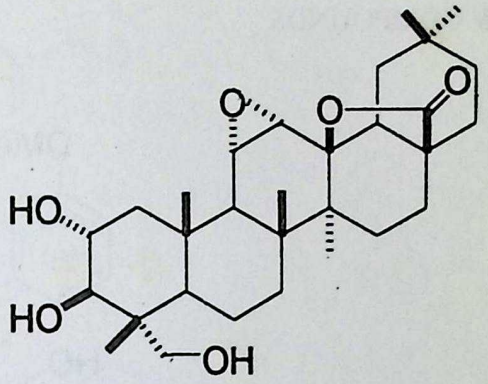


Methyl picrotoxate
R = C(Me)=CH_2



I

ANANAS (Bromeliaceae)

A. comosus (L.) Merr. syn. *A. sativus* Schult.f. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 46).

Ethyl acetate and ethyl 3-(methylthio)propanoate in volatile oil of green pineapple and ethyl acetate and butane-2,3-diol diacetate in that from ripe pineapple, identified by GC-MS (*J. Agric. Food Chem.* 1992, *40*, 599; *Chem. Abstr.* 1992, *116*, 192877 z); purified enzyme, bromelain, from Korean plant (*Han 'guk Nonghwa Hakhoechi* 1992, *35*, 23; *Chem. Abstr.* 1992, *117*, 46934 v).

A. sativus Schult.f.; see *A. comosus* (L.) Merr.

ANAPHALIS (Asteraceae)

A. contorta (D.Don) Hook.f. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 47).

A new acylflavonoid glycoside - anaphaloside - isolated from flowers and its structure determined; isoquercitrin and astragalin also isolated (*J. Chin. Chem. Soc.* 1993, *40*, 93; *Chem. Abstr.* 1993, *119*, 91212 k).

ANCHUSA (Boraginaceae)

A. sikkimensis Clarke; see *Microula sikkimensis* (Clarke) Hemsl.

ANCISTROCLADUS (Ancistrocladaceae)

A. heyneanus Wall. ex DC. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 44).

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A novel naphthylisoquinoline alkaloid - isoancistrocladine - isolated from roots and characterised (*Phytochemistry* 1994, *35*, 259).

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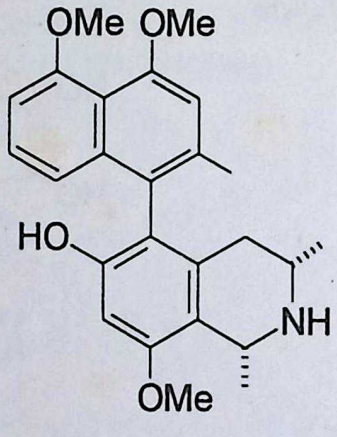

Isoancistrocladine

ANDIRA (Papilionaceae)

A. inermis Kunth (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 32).

Taxifolin, genistein, baptigenin, daidzein and 3'-methoxydaidzein isolated (*Fitoterapia* 1991, *62*, 89).

ANDROGRAPHIS (Acanthaceae)

A. paniculata (Burm.) Wall. ex Nees (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 48).

Alcoholic extract of plant exhibited antidiarrhoeal activity against *Escherichia coli* enterotoxins in animal models (*Int. J. Crude Drug Res.* 1990, *28*, 273); leaf extract showed significant cytotoxicity against KB and P388 cells (*J. Sci. Res. Thailand* 1992, *18*, 187; *Chem. Abstr.* 1994, *121*, 251259 c).

Crystal structures of andrographolide, neoandrographolide, 14-deoxyandrographolide and 14-deoxy-11,12-didehydroanhydrographolide assigned and conformations of lactone and glucose side-chains deduced (*J. Chem. Soc.* Perkin 2 1990, 1011); structure of 3,7,8,2'-tetramethoxy-5-hydroxyflavone confirmed by synthesis (*Proc. Indian Natl. Sci. Acad.* 1990, *56A*, 279; *Chem. Abstr.* 1991, *114*, 121806 y); 5-hydroxy-7,8-dimethoxyflavone synthesised (*J. Serb. Chem. Soc.* 1992, *57*, 217; *Chem. Abstr.* 1992, *117*, 48150 k); isolation of andrographolide, 14-deoxy-11,12-didehydroandrographolide, neoandrographolide and stigmasterol (*J. Sci. Res. Thailand* 1992, *18*, 187; *Chem. Abstr.* 1994, *121*, 251259 c).

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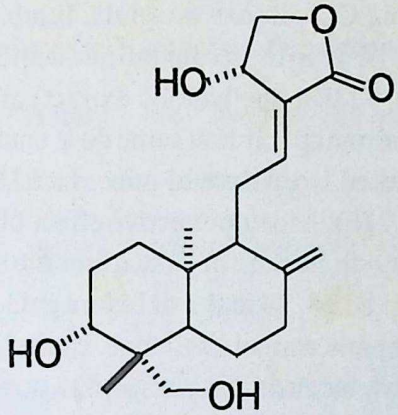

Andrographolide

BIOLOGICAL ACTIVITY

Andrographolide, neoandrographolide, deoxyandrographolide and andrographiside tested for antidiarrhoeal activity against *Escherichia coli* enterotoxin *in vivo*. Andrographolide and neoandrographolide showed activity similar to that of loperamide against *E. coli* LT and LT/ST enterotoxins. Andrographolide had greater activity against ST enterotoxin, the most common cause of epidemics of neonatal diarrhoea (*Int. J. Crude Drugs Res.* 1990, *28*, 273); andrographolide exhibited potent cytotoxic effect in KB cell cultures and P-388 lymphocytic leukaemia whereas 14-deoxy-11,12-didehydroandrographolide and neoandrographolide did not show any cytotoxicity (*J. Sci. Res. Thailand* 1992, *18*, 187; *Chem. Abstr.* 1994, *121*, 251259 c); andrographolide exhibited strong choleretic action when administered i.p. to rats. It induced increase in bile flow together with change in physical properties of bile secretion (*Phytother. Res.* 1991, *5*, 176; *Chem. Abstr.* 1991, *115*, 198161 n); it also produced significant dose-dependent (1.5 to 12.0 mg/kg) choleretic effect (4.8 to 73.0%) as shown by increase in bile flow, bile salt and bile acids in conscious rats and anaesthetised guinea pigs. Paracetamol-induced decrease in volume of bile was prevented significantly by andrographolide pretreatment. It was found to be more potent than silymarin (*Planta Med.* 1992, *58*, 146); andrographolide and neoandrographolide significantly stimulated antibody and delayed - type hypersensitivity response to sheep red blood cells (SRBC) in mice. Plant extract also stimulated non-specific immune response of animals. Stimulation of antigen-specific and non-specific immune responses with andrographolide was less than with ethanol extract of plant, suggesting thereby that constituents other than andrographolide present in extract may also be contributing immunostimulation (*J. Nat. Prod.* 1993, *56*, 995); administration of andrographolide, andrographiside and neoandrographolide (0.1 g/kg, i.p. for 7 days) caused significant elevation of different enzymes of cellular antioxidant defense mechanism and reduction in lipid peroxidation in CCl_4-treated mice, revealing that antioxidant action may play a role in antihepatotoxic activity (*Indian J. Pharmacol.* 1994, *26*, 296).

Andrographolide found to be almost devoid of antihepatitis B virus surface antigen (anti-HBS)-like activity whereas picroliv showed promising activity (*Indian J. Med. Res.* 1990, *92*, 133); antihepatotoxic activity of 0.1 g/kg, i.p., andrographolide was compared with

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861.33 mg/kg, i.p., of total methanolic extract and 761.33 mg/kg i.p., of andrographolide-free methanolic extract of plant using CCl_4-intoxicated rats. Inhibition of CCl_4-induced increase in biochemical parameters (GOT, GPT, SAP, serum bilirubin and hepatic triglycerides) was found to be 48.6% (andrographolide), 32.0% (methanolic extract) and 15.0% (andrographo-lide-free methanolic extract). Further, andrographolide at same dose completely normalized CCl_4-induced increase in pentobarbitone-induced sleep time of mice. Its LD50 (i.p.) in mice was 11.46 g/kg (*Indian J. Med. Res.* 1990, *92*, 276); hepatoprotective effect of andrographolide was studied on acute hepatitis induced in rats by single dose of galactosamine or paracetamol. Treatment of rats with 0.4 g/kg, i.p., or 0.8 g/kg, p.o., 48, 24 and 2 hr before galactosamine administration or with 0.2 g/kg, i.p., 1, 4 and 7 hr after paracetamol challenge, caused complete normalisation of toxin-induced increase in levels of five biochemical parameters and significantly ameliorated toxin-induced histopathological changes in liver of experimental animals (*Indian J. Med. Res.* 1990, *92*, 284); andrographolide, andrographiside and neoandrographolide investigated for their protective effect against hepatotoxicity induced in mice by CCl_4 or tert.butyl hydroperoxide. Pretreatment of mice with these substances (0.1 g/kg, i.p.) for 3 consecutive days decreased malondialdehyde formation, reduced glutathione depletion and enzyme leakage of glutamic pyruvate transaminase and alkaline phosphatase in both groups of toxin-treated animals. Andrographolide exhibited lower protectivity than andrographiside and neoandrographolide which were as effective as silymarin (*Biochem. Pharmacol.* 1993, *46*, 182); single dose pretreatment with andrographolide (0.02 to 0.2 g/kg, i.p.) or aqueous extract of leaves (0.3 to 1.00 g/kg, p.o.) 48 hr and 4 hr respectively before ethanol (4.0 g/kg, po.) administration, significantly reduced toxicity induced by ethanol. Similar results obtained by 7 days pretreatment with andrographolide (0.1 g/kg/day, i.p.) or aqueous extract of leaves (0.5 g/kg/day, p.o.) (*Asia Pac. J. Pharmacol.* 1994, *9*, 73; *Chem. Abstr.* 1994, *121*, 246187 y).

ANDROPOGON (Poaceae)

A. citratus DC.; see *Cymbopogon citratus* (DC.) Stapf

A. distans Nees ex Steud.; see *Cymbopogon distans* (Nees ex Steud.) Wats.

A. jwarancusa Jones; see *Cymbopogon jwarancusa* (Jones) Schult.

A. jwarancusa Jones ssp. *loniger* Desf.; see *Cymbopogon jwarancusa* (Jones) Schult. ssp. *olivieri* (Boiss.) Soenarko

A. khasianus Munro ex Duthie; see *Cymbopogon khasianus* (Hack.) Stapf ex Bor

A. nardus L. var. *coloratus* Nees ex Hook.f.; see *Cymbopogon coloratus* (Nees ex Hook.f.) Stapf

A. nardus L. var. *flexuosus* (Nees ex Steud.) Hack.; see *Cymbopogon flexuosus* (Nees ex Steud.) Wats.

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A. nardus L. var. *microstachys* Hook.f.; see *Cymbopogon microstachys* (Hook.f.) Soenarko

A. schoenanthus L.; see *Cymbopogon schoenanthus* (L.) Spreng.

A. schoenanthus L. var. *martinii* Hook.f.; see *Cymbopogon martinii* (Roxb.) Wats.

A. sorghum Brot.; see *Sorghum bicolor* (L.) Moench

A. squarrosus Hook.f. (non L.f.); see *Vetiveria zizanioides* (L.) Nash

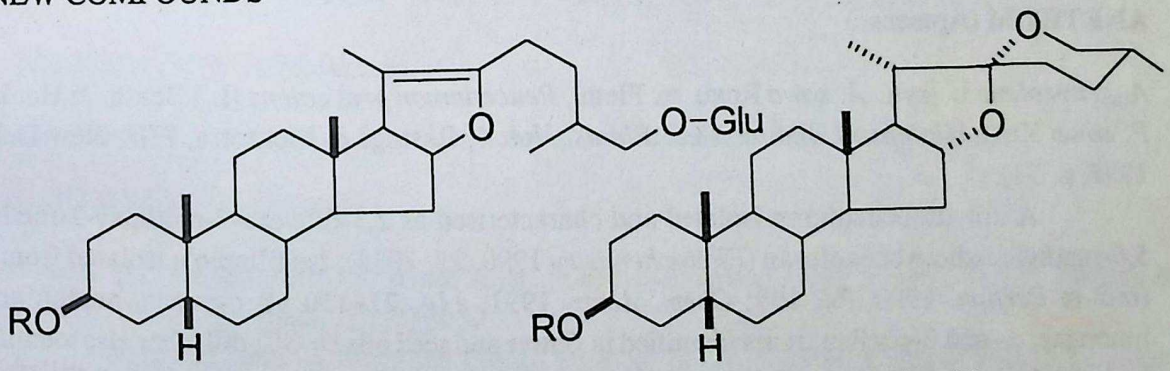
ANEMARRHENA (Liliaceae)

A. asphodeloides Bunge (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 50).

Aqueous extract of rhizomes lowered blood glucose level in alloxan-diabetic mice (*J. Nat. Prod.* 1993, *56*, 345).

A new active steroidal saponin - anemarsaponin B - isolated from rhizomes and its structure established along with isolation of anemarsaponins A1 and A2 (*Plants Med.* 1991, *57*, 460; *Yaoxue Xuebao* 1992, *27*, 26; *Chem. Abstr.* 1992, *117*, 219813 k); a new saponin - smilageninoside - isolated from rhizomes and characterised as smilagenin-3-O-β-D-glucopyranosyl(1→2)-β-D-mannopyranoside; smilagenin also isolated (*Yaoxue Xuebao* 1991, *26*, 619; *Chem. Abstr.* 1992, *116*, 80421 q); isolation of pseudoprototimosaponin AIII whose structure was identical to that of anemarsaponin B (*J. Nat. Prod.* 1993, *36*, 345).

NEW COMPOUNDS



Anemarsaponin B
R = Gal(2→1)Glu

Smilageninoside
R = Mannose(2→1)Glu

BIOLOGICAL ACTIVITY

Pseudoprototimosaponin AIII and prototimosaponin AIII exhibited hypoglycaemic effects in a dose-dependent manner in streptozotocin-diabetic mice but did not affect glucose uptake and insulin release (*J. Nat. Prod.* 1993, *56*, 345).

ANEMONE (Ranunculaceae)

A. coronaria L.

Eng. - Poppy flowered anemone

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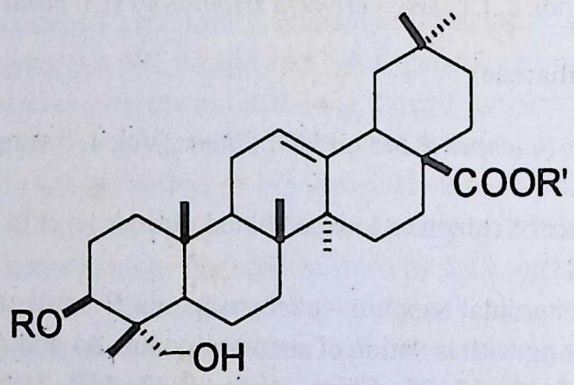
New triterpene saponins - koronaroside A, koronaroside B and koronaroside C - isolated and their structures determined; delphinidin arabinoside also isolated (*Fitoterapia* 1992, *63*, 191).

Distribution : Native of Europe and Central Asia, introduced into Indian gardens.

NEW COMPOUNDS



Koronaroside A
R = Ara(2→1)Rha, R' = H
Koronaroside B
R = Ara(2→1)Rha, R' = Glu(6→1)Glu(4→1)Rha
Koronaroside C
R = Ara(4→1)Glu(2→1)Rha, R' = Glu(6→1)Glu(4→1)Rha

ANETHUM (Apiaceae)

A. graveolens L. syn. *A. sowa* Roxb. ex Flem., *Peucedanum graveolens* (L.) Benth. & Hook.f., *P. sowa* Kurz (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 51).

A dihydrobenzofuran isolated and characterised as 2,3-dihydro-7-methoxy-2-methyl-5,6-methylenedioxybenzofuran (*Phytochemistry* 1990, *29*, 2035); isodillapiole isolated from oil (*Indian Perfum.* 1990, *34*, 199; *Chem. Abstr.* 1991, *114*, 214150 v); carvone, anethofuran, limonene, α- and β-phellandrenes identified in flower and seed oils by GC; dill ether also identified and absolute configuration of dill ether determined (*J. Essent. Oil Res.* 1991, *3*, 257; *Chem. Abstr.* 1992, *116*, 57739 r; *Chem. Mikrobiol. Technol. Lebensm.* 1991, *13*, 183; *Chem. Abstr.* 1992, *117*, 24937 w); 4-vinyl-2-methoxyphenol, 4-hydroxy-3-methyl-6-(1-methylethyl)-cyclohex-2-en-1-one and nonacosa-10-one also identified in dill flower (*Chem. Mikrobiol. Technol. Lebensm.* 1991, *13*, 183; *Chem. Abstr.* 1992, *117*, 24937 w); determination of limonene (30.3), dillapiole (26.8), carvone (22.0), piperitone (8.2%), 8-dehydro-p-cymene and linalyl acetate in fruit essential oil by GC-MS (*Int. J. Pharmacog.* 1992, *30*, 139; *Chem. Abstr.* 1992, *117*, 258036 d).

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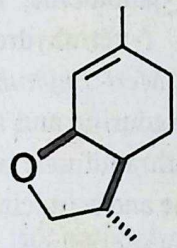
NEW COMPOUNDS



Dill ether

BIOLOGICAL ACTIVITY

Isodillapiole tribromide showed fungicidal activity against *Helminthosporium oryzae* and *Aspergillus niger* (*Indian Perfum.* 1990, *34*, 199; *Chem. Abstr.* 1991, *114*, 214150 v).

A. sowa Roxb. ex Flem.; see *A. graveolens* L.

ANGELICA (Apiaceae)

A. glauca Edgew. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 52).

2,2-Dimethyloxirane, formic acid, 6-methyl-bicyclo[3,2,0]-hepten-2-one, 6-propyl-bicyclo[3,2,0]-hept-6-dien-2-one, 6-propylbicyclo[3,2,0]-hept-6-one, [l(S)-(1α, 3aβ, 4α, 8aβ)]-1,4-methanoazulene, β-chamigrene, dehydroledol and elemol identified in root essential oil by GC (*Zhiwu Ziyuan Yu Huanjing* 1992, *1*, 44; *Chem. Abstr.* 1993, *118*, 219586 j).

ANISOGONIUM (Athyriaceae)

A. esculentum (Retz.) Presl; see *Diplazium esculentum* (Retz.) Sw. ex Schrad.

ANISOMELES (Lamiaceae)

A. indica (L.) Kuntze syn. *A. ovata* R.Br. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 52).

Determination of β-pinene (28.0), eugenol (24.5), caryophyllene (15.2), 1,8-cineole (11.9), citral (9.5), methyl chavicol (9.2), α-pinene (7.0), azulene (6.0), (+)limonene (3.0), nerol (2.2), borneol (2.13) and α-terpineol (2.1%) in leaf essential oil by GLC (*Indian Perfum.* 1991, *35*, 119; *Chem. Abstr.* 1991, *115*, 189554 r).

A. ovata R. Br.; see *A. indica* (L.) Kuntze

ANNONA (Annonaceae)

A. cherimolia Mill. (*cherimola*) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 53).

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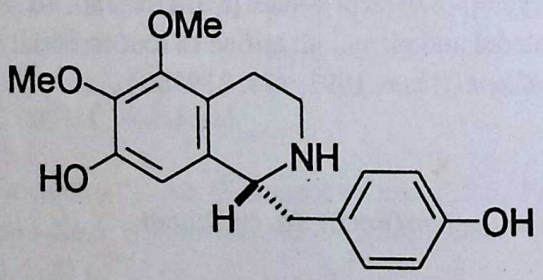
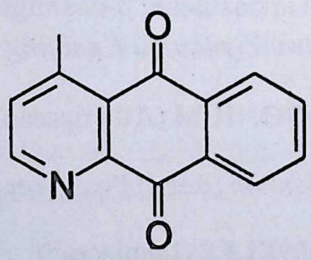
Isolation of (-)corypalmine, (-)discretamine, (+)glaziovine, (+)isoboldine, (-) asimilobine, (+)reticuline, (-)corydine, (-)anolobine, lysicamine, liriodenine, lanuginosine, (-) nuciferine, (+)anonaine, (-)xylopine, (-)tetrahydropalmatine, (-)stepholidine and (-)N-methylasimilobine from stem bark (*Plant. Med. Phytother.* 1989, *23*, 159; *Chem. Abstr.* 1990, *112*, 195246 w); new acetogenins - laherradurine and almunequine - isolated from seeds and structure of former established; an azaanthraquinone alkaloid - cleistopholine - also isolated along with cherimoline, dihydrocherimoline and asimicine (*Planta Med.* 1989, *55*, 321); isolation and structure elucidation of a new alkaloid - anomoline - from stems; oxoushinsunine, anonaine, michelalbine, reticuline, anolobine, asimilobine and β-sitosterol also isolated (*Zhonghua Yaoxue Zazhi* 1991, *43*, 457; *Chem. Abstr.* 1992, *117*, 44523 m); two new cytotoxic bis-tetrahydrofuranic acetogenins - molvizarin and motrilin - isolated from seeds and their structures determined (*Tetrahedron* 1991; *47*, 8195); isolation of two more acetogenins - itrabin and jatein - from seeds and their structure determination (*Tetrahedron Lett.* 1991, *32*, 6133); structures of cherimolin 1, laherradurine and otivarin (dihydrocherimolin) revised (*Tetrahedron Lett.* 1991, *32*, 6133; *Phytochemistry* 1993, *32*, 1475); another two acetogenins - cherimolin 2 and almunequine - isolated from seeds and their structures determined (*Phytochemistry* 1993, *32*, 1475); isolation and structure determination of three new isoacetogenines - isocherimolin 1, isomolvizarin 1 and isomolvizarin 2 - from roots; bullatacinone, squomocin and almunequin also isolated (*J. Nat. Prod.* 1994, *57*, 911).

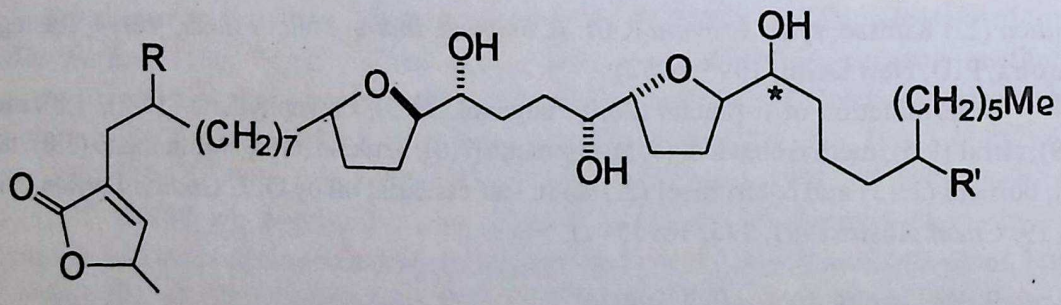
NEW COMPOUNDS



Anomolin



Cleistopholine



Cherimolin 1
R = OH, R' = H, * = erythro
Cherimolin 2
R = OH, R' = H, * = threo
Almunequin
R = H, R' = OH, * = erythro

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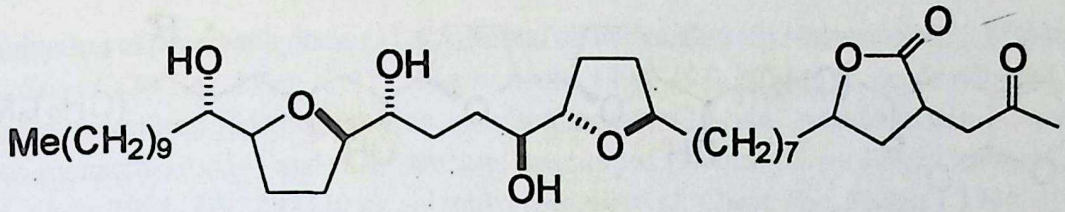
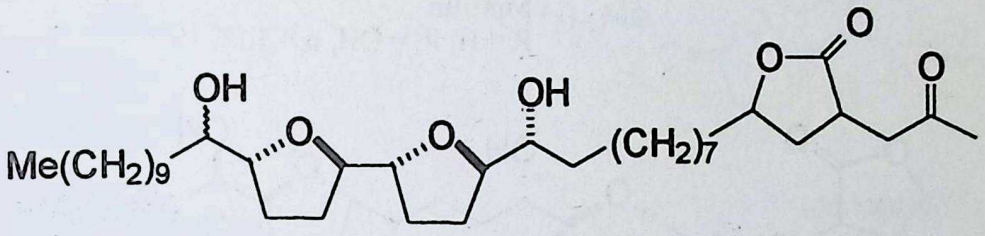
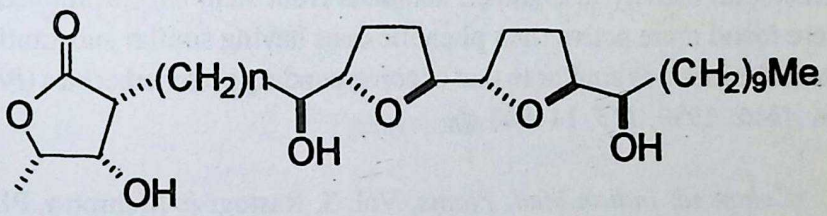


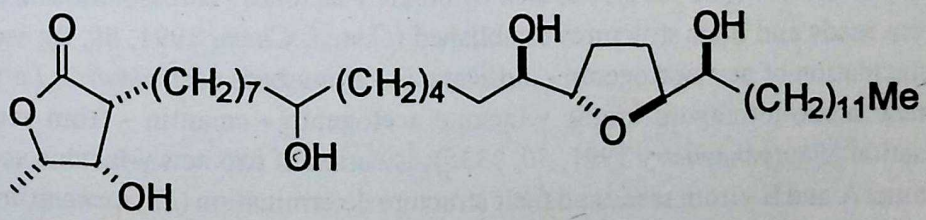
Isocherimolin 1



Isomolvizarin 1
~~ = α
Isomolvizarin 2
~~ = β



Itrabin
n = 10
Laherradurin
n = 12



Jatein

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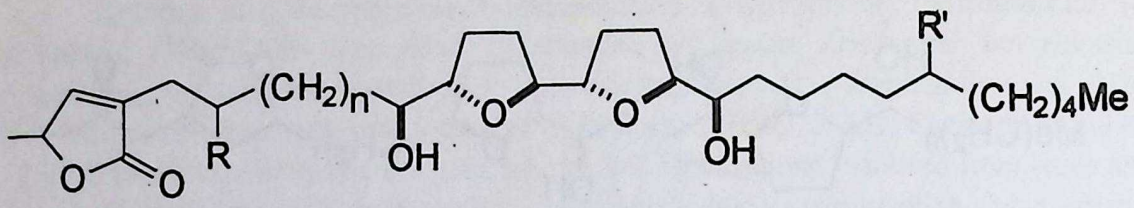
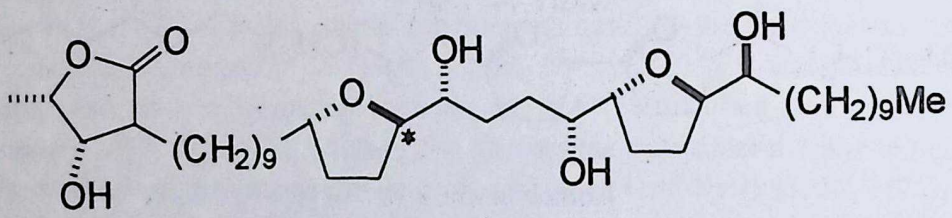


Molvizarin
R = OH, R' = H, n = 8
Motrilin
R = H, R' = OH, n = 10



Otivarin
* = threo

BIOLOGICAL ACTIVITY

Antimicrobial activity of eighteen alkaloids from stem bark examined. Nonphenolic compounds were found more active than phenolic ones having similar substitution. Activity of tetrahydroprotoberberines was similar to that of corresponding protoberberines (*Pharmazie* 1990, *45*, 442; *Chem. Abstr.* 1990, *113*, 144883 q).

A. muricata L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p.48).

Alcoholic extract of seeds exhibited pesticidal activity against adult *Callosobruchus chinensis* (*Nogaku Shuho* 1990, *34*, 253; *Chem. Abstr.* 1990, *113*, 188067 f); seed extract was toxic to brine shrimp larvae and KB cells (*Can. J. Chem.* 1991, *69*, 8).

Isolation and structure determination of a new monotetrahydrofuran - murisolin - from seeds (*Heterocycles* 1990, *31*, 861); two new cytotoxic γ-lactones - corossolone and corossolin - isolated from seeds and their structures established (*Can. J. Chem.* 1991, *69*, 8); isolation and structure elucidation of new acetogenin - muricatacin - from seeds (*Tetrahedron Lett.* 1991, *32*, 1137); a new mono-tetrahydrofuranic γ-lactone acetogenin - solamin - from seeds and its characterisation (*Phytochemistry* 1991, *30*, 3335); isolation of two new γ-lactone acetogenins - epomuricenins A and B - from seeds and their structure determination (*Phytochemistry* 1993, *34*, 281); two new biogenetic precursors - epoxymurins A and B - isolated from stem bark and their structures established; diepomuricanin and solamin also isolated (*Tetrahedron* 1993, *49*, 6913); isolation of three new acetogenins - muricatetrocins A and B and gigantetrocin B - from seeds and their structure determination; gigantetrocin A also isolated (*Helv. Chim. Acta* 1993, *76*, 2433);

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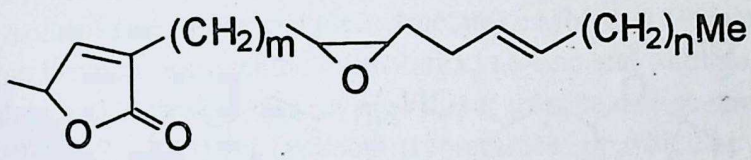
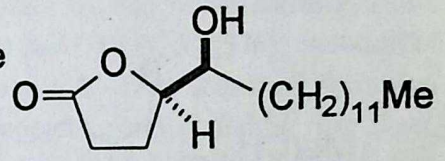
determination of β-caryophyllene (31.4%) in leaf oil and methyl (E)2-hexanoate (39.8%) in fruit oil (*J. Essent. Oil Res.* 1994, *6*, 411; *Chem. Abstr.* 1994, *121*, 163668 e); seeds afforded three monotetrahydrofuran type acetogenins - neoisoannonacin-10-one, neoannonacin-10-one and isoneoannonacin-10-one - and their structure determined (*Yunnan Zhiwu Yanjiu* 1994, *16*, 187; *Chem. Abstr.* 1994, *121*, 297130 g); solamin synthesised (*J. Chem. Soc.* Perkin 1 1994, 1975).

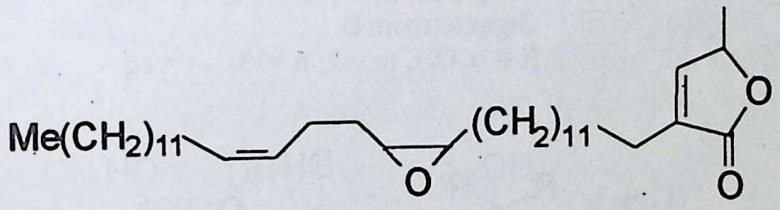
NEW COMPOUNDS



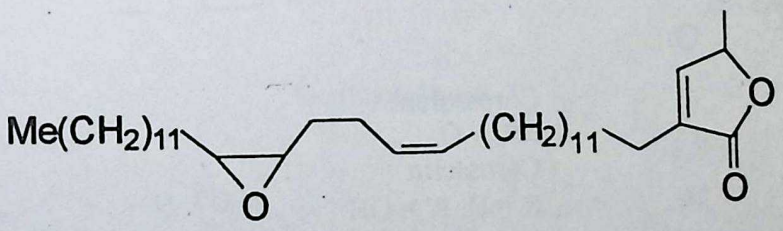
Epomuricenin A
m = 12, n = 11
Epomuricenin B
m = 10, n = 13



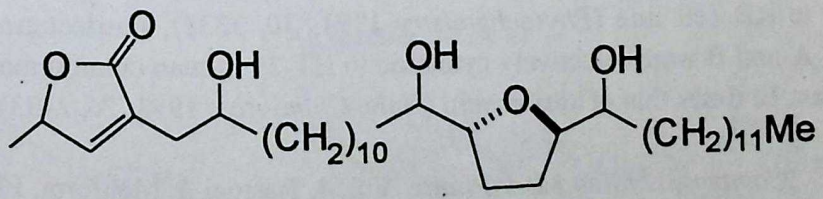
Muricatacin



Epoxymurin A



Epoxymurin B



Murisolin

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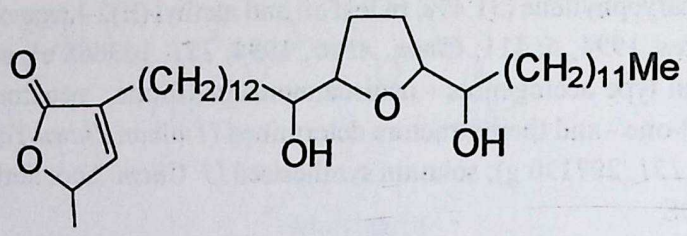
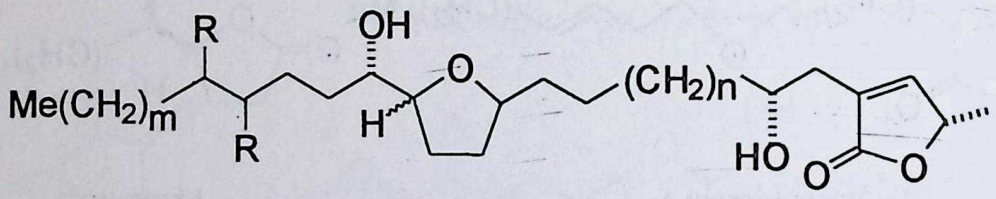
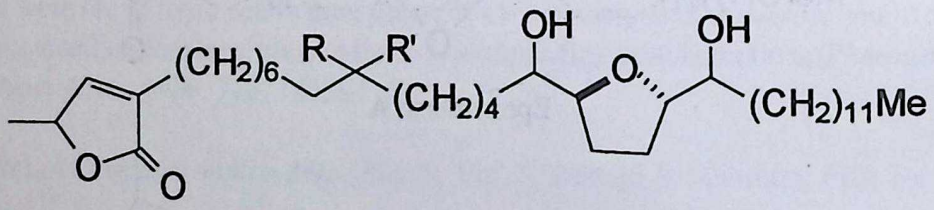


Solamin



Muricatetrocin A
R = β-OH, m = 4, n = 11, ~~ = ax.
Muricatetrocin B
R = β-OH, m = 4, n = 11, ~~ = eq.
Gigantetrocin B
R = α-OH, m = 2, n =13, ~~ = eq.



Corossolone
RR' = O
Corossolin
R = H, R' = OH

BIOLOGICAL ACTIVITY

All acetogenins showed marked *in vitro* toxicity at 0.01 μg/ml to VERO cell line and at 0.0001 μg/ml to KB cell line (*Phytochemistry* 1991, *30*, 3335); muricatetrocins A, B and gigantetrocins A and B were selectively cytotoxic to HT-29 human colon tumor cell line with potencies at least 10 times that of adriamycin (*Helv. Chim. Acta* 1993, *76*, 2433).

A. reticulata L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 53).

Alcoholic extract of seeds showed pesticidal activity against adult *Callosobruchus chinensis* (*Nogaku Shuho* 1990, *34*, 253; *Chem. Abstr*. 1990, *113*, 188067f).

Isolation of (-)kaur-16-en-19-oic acid, 16α-hydroxy-(-)kauran-19-oic acid and methyl 17-hydroxy-(-)kauran-19-oate from stem bark and their structure elucidation (*J. Bangladesh*

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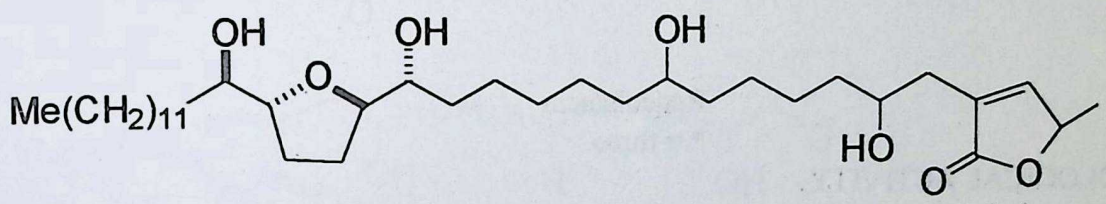
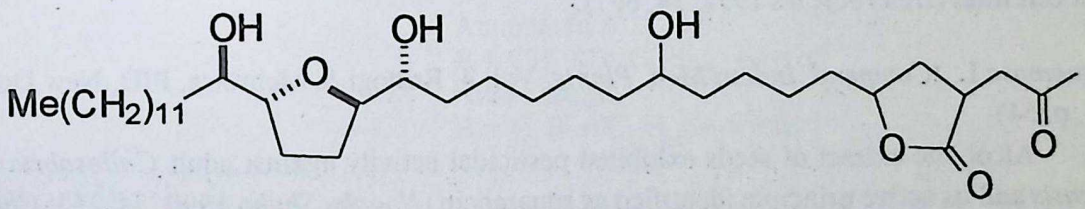
Acad. Sci. 1989, *13*, 157; *Chem. Abstr.* 1990, *112*, 175639 y); a new monotetrahydrofuran acetogenin - reticulatacin - isolated from bark and its structure determined; (-) kaur-16-en-19-oic acid, methyl 16β,17-dihydro-(-)kauran-19-oate and liriodenine also isolated (*Tetrahedron* 1991, *47*, 2751); isolation of two new cytotoxic acetogenins - annoreticuin and isoannoreticuin - from leaves and their structure determination (*Heterocycles* 1992, *34*, 667); aequaline, asimilobine, liriodenine and norushinsunine isolated from rhizomes (*Zhongguo Zhongyao Zazhi* 1992, *17*, 295; *Chem. Abstr.* 1992, *117*, 108176 k); two more acetogenins - squamocin and rolliniastatin 1 - isolated from seeds and their structures established (*Planta Med.* 1993, *59*, 576); isolation of another new acetogenins - annoreticuin-9-one and rolliniastatin 2 - from leaves of Formosan plant and their structure determination; solamin and annomonicin also isolated (*J. Nat. Prod.* 1993, *56*, 1688); N-fattyacyl tryptamines, in which acyl ranged from hexadecanoyl to hexacosanoyl, identified in seeds (*Phytochemistry* 1993, *34*, 1633).

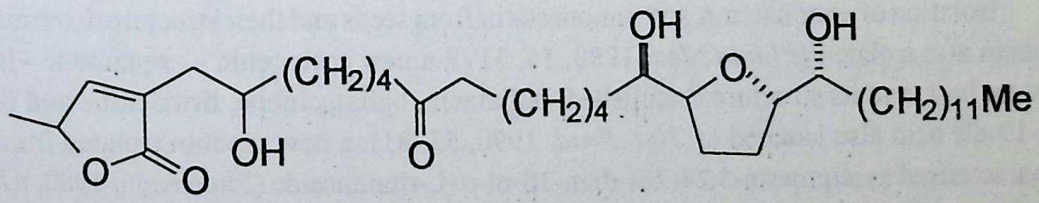
NEW COMPOUNDS



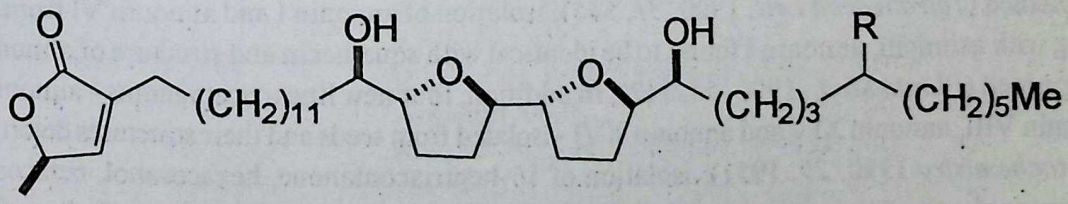
Annoreticuin



Isoannoreticuin



Annoreticuin-9-one



Squamocin
R = β-OH
Rolliniastatin 1
R = H

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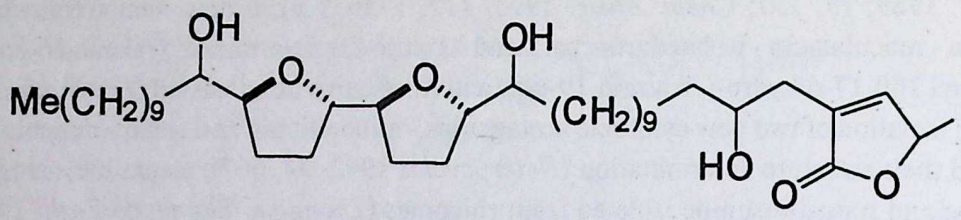
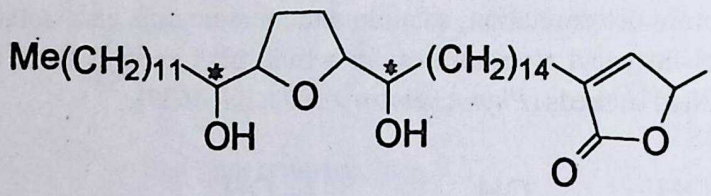


Rolliniastatin 2



Reticulatacin
* = threo

BIOLOGICAL ACTIVITY

Annoreticuin and isoannoreticuin were found to be selectively cytotoxic to certain human tumor cell lines (*Heterocycles* 1992, *34*, 667).

A. squamosa L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 54).

Alcoholic extract of seeds exhibited pesticidal activity against adult *Callosobruchus chinensis* and its active principle identified as squamocin (*Nogaku Shuho* 1990, *34*, 253; *Chem. Abstr.* 1990, *113*, 188067 f).

Isolation of annonacin A and annonastatin from seeds and their structure determination, annonacin also isolated (*Planta Med.* 1990, *56*, 317); a new acetogenin - squamone - isolated from stem bark and its structure established; bullatacin, bullatacinone, liriodenine and (-)kaur-16-en-19-oic acid also isolated (*J. Nat. Prod.* 1990, *53*, 81); a new saponin isolated from seeds and characterised as stigmasta-5,24(28)-dien-3β-ol-α-L-rhamnoside (*Fitoterapia* 1990, *61*, 359); a new bis-tetrahydrofuran fatty acid γ-lactone - squamostatin A - isolated and its structure established (*Tetrahedron Lett.* 1990, *31*, 535); isolation of annonin I and annonin VI from seeds along with asimicin; annonin I found to be identical with squamocin and structure of annonin VI determined (*Planta Med.*. 1990, *56*, 312); in addition, four new linear acetogenins - annonin IV, annonin VIII, annonin XIV and annonin XVI - isolated from seeds and their structures determined (*Phytochemistry* 1990, *29*, 1951); isolation of 16-hentriacontanone, hexacosanol, octacosanol, triacontanol., sitosterol, campesterol and stigmasterol from leaves (*Acta Cienc. Indica, Chem.* 1992, *18*, 249; *Chem. Abstr.* 1994, *121*, 31137 w); isolation of squamosamide from branches

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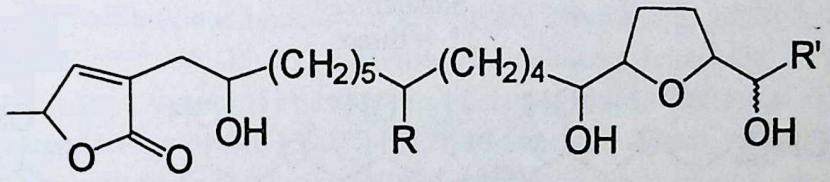
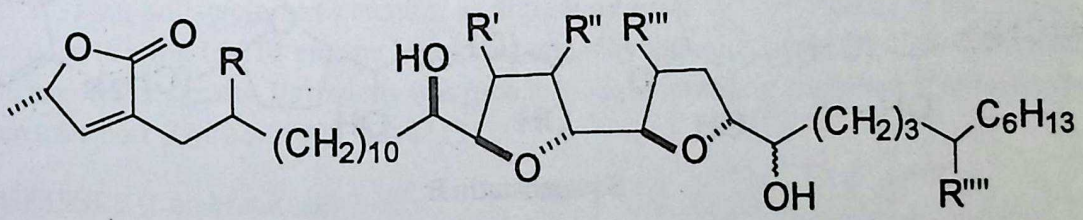
and its structure determination; liriodenine, moupinamide, anonaine and sachanoic acid also isolated (*Yaoxue Xuebao* 1992, *27*, 185; *Chem. Abstr.* 1992, *117*, 86699 d); determination of germacrene D (17.5), β-elemene (12.0), sabinene (8.8), α- and β-pinenes (8.1), bicyclogermacrene (6.0), T-cadinol (5.5) and T-muurolol (4.4%) in leaf oil (82.0%), fruit oil contained spathulenol, bornyl acetate, germacrene D, borneol and verbenone (*J. Essent. Oil. Res.* 1993, *5*, 557; *Chem. Abstr.* 1994, *121*, 153278 p); isolation of anonaine (*Insect Sci. Its Appl.* 1993, *14*, 93; *Chem. Abstr.* 1994, *121*, 78270 z); a new polyketide - squamostatin B - isolated from seeds and its stereostructure determined; annonin, deacetyluvaricin and daucosterol also isolated (*Chinese Chem. Lett.* 1993, *4*, 423; *Chem. Abstr.* 1994, *120*, 73331 q; *Yaoxue Xuebao* 1994, *29*, 443; *Chem. Abstr.* 1994, 121, 226446 d); a new acetogenin - squamostanal A - isolated from seeds and characterised as 5(S)3-(12-formyldodecyl)-5-methyl-2,5-dihydrofuran-2-one (*Biosci., Biotechnol., Biochem.* 1996, *58*, 1146; *Chem. Abstr.* 1994, *121*, 153311 u); a new acetogenin - squamosten A - isolated from seeds and its structure established (*Chem. Pharm. Bull.* 1994, *42*, 388).

NEW COMPOUNDS



Annonacin A
R = OH, R' = $C_{12}H_{25}$, ~ = α
Annonastatin
R = H, R' = $C_{15}H_{31}$ ~ = β



Annonin IV
R,R' = OH, R'',R''',R'''' = H, ~ = β
Annonin VIII
R,R' = OH, R'',R''',R'''' = H, ~ = α
Annonin XIV
R,R',R'''' = H, R'',R''' = OH, ~ = α
Annonin XVI
R,R'',R''' = H, R',R'''' = OH, ~ = α

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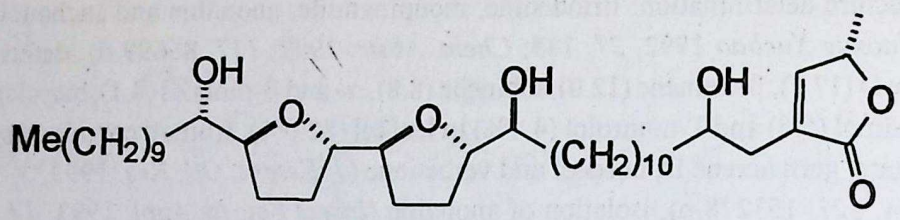
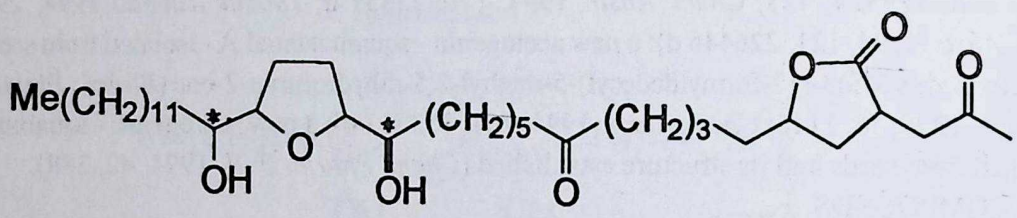
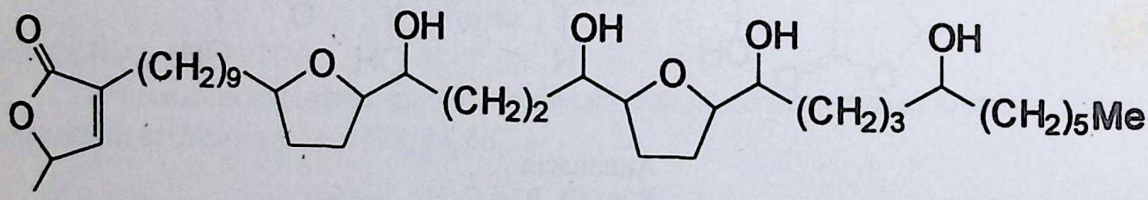


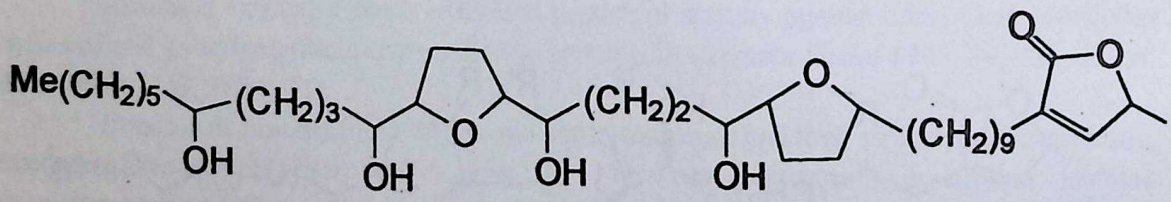
Annonin VI



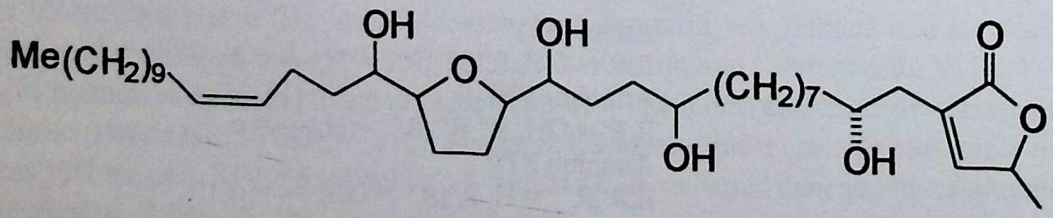
Squamone
*** = threo**



Squamostatin A



Squamostatin B



Squamosten A

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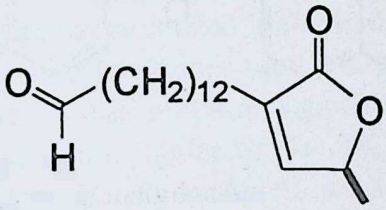
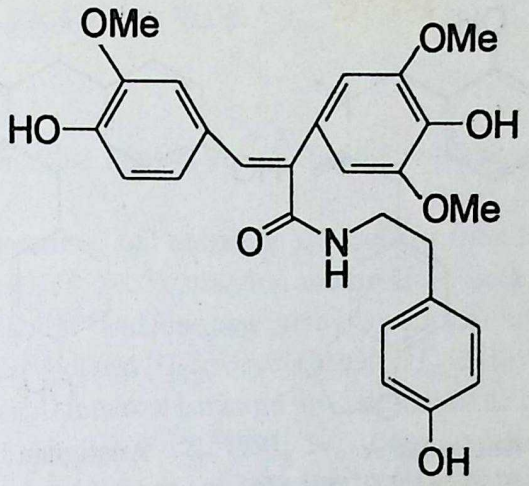


Squamostanal A



Squamosamide

BIOLOGICAL ACTIVITY

Squamone and bullatacinone were selectively cytotoxic to MCF-7 human breast carcinoma (*J. Nat. Prod.* 1990, *53*, 81); annonin VI exhibited cytotoxicity to HeLa cells and weak insecticidal activity. Annonin I and annonin VI showed good anthelmintic activity against *Caenorhabditis elegans* (*Planta Med.* 1990, *56*, 312); 16-hentriacontanone, sitosterol, campesterol and stigmasterol exhibited antibacterial activity against *Staphylococcus aureus, S. albus, Streptococcus viridans, Escherichia coli, Pseudomonas pyocyanea* and *Klebsiella* (*Acta Cienc. Indica, Chem.*. 1992, *18*, 249; *Chem. Abstr*, 1994, *121*, 31137 w); anonaine, glaucine and stepholidine produced dose-dependent inhibition of microsomal lipid peroxidation induced by Fe^{2+} /ascorbate or by Fe^{3+} ADP/NADPH. Stepholidine was also potent inhibitor of nitroblue tetrazolium (NBT) reduction (*Free Radical Res. Commun.* 1993, *18*, 167; *Chem. Abstr.* 1993, *119*, 195131 z); bullatacin has potential as antitumor agent *in vivo* because of its efficacy in normal mice bearing L1210 murine leukaemia and athymic mice bearing A2780 conventional ovarian cancer xenografts. Its toxicity was probably due to its strong inhibition of mitochondrial electron transport (*Life Sci.* 1993, *53*, 1113).

ANOGEISSUS (Combretaceae)

A. acuminata (Roxb. ex DC.) Wall. ex Guill. & Perr. var. *acuminata*

Beng. - Chakwa; Kan. - Pansi; Oriya - Pansi, Pasi; Tam. - Nunnera, Panchi; Tel. - Buckakaram, Panchman, Pansi; Bihar - Garahesel, Pansia; Rajasthan - Dhauria.

Three new lignans - anolignans A, B and C - isolated along with (-)seco-isolariciresinol and characterised (*J. Nat. Prod.* 1994, *57*, 896).

Distribution : Bundelkhand in Uttar Pradesh and sourthwards to Andhra Pradesh and eastwards to Bengal, Bihar, Orissa, Madhya Pradesh, Mizoram and Maharashtra.

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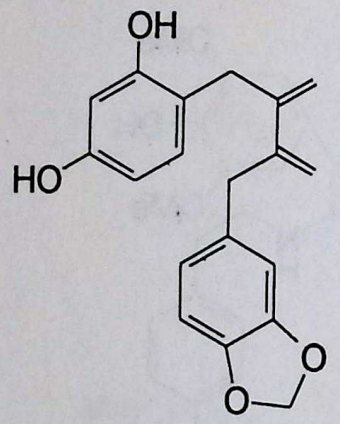
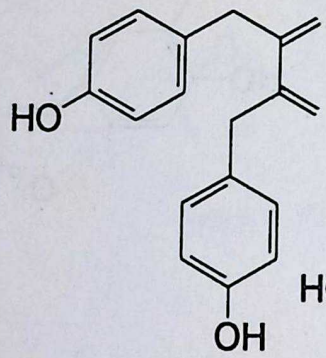
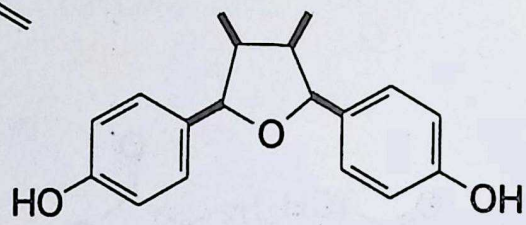


Anolignan A



Anolignan B



Anolignan C

BIOLOGICAL ACTIVITY

Anolignans A and B showed HIV-1 reverse transcriptase inhibitory activity (*J. Nat. Prod.* 1994, *57*, 896); pterostilbene and dihydrodehydrodiconiferyl alcohol exhibited *in vitro* cytotoxicity to various cancer cell lines (*Nat. Prod. Lett.* 1994, *4*, 267; *Chem. Abstr.* 1994, *121*, 276683 z).

A. latifolia (Roxb. ex DC.) Wall. ex Guill. & Perr. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 54).

A new flavone glycoside isolated from roots and characterised as luteolin-7-O-β-D-galactosyl(1→6)-O-β-D-galactoside (*Acta Cienc. Indica, Chem.* 1991, *17*, 155; *Chem. Abstr.* 1992, *117*, 66594 n); isolation of a new saponin - 3-O-acetyl-olean-12-en-28-oic-O-β-D-glucopyranosyl(1→4)-β-D-xylopyranoside - from leaves and its structure elucidation (*Acta Cienc. Indica, Chem.* 1992, *18*, 153; *Chem. Abstr.* 1994, *121*, 53927 f).

ANTHEMIS (Asteraceae)

A. nobilis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 55).

3-Phenylpropyl isobutyrate, tridecanal and pentadecanal identified in Roman camomile oil (*J. Essent. Oil Res.* 1991, *3*, 309; *Chem. Abstr.* 1992, *116*, 55555 d).

ANTHOCEPHALUS (Rubiaceae)

A. cadamba (Roxb.) Miq.; see *A. chinensis* (Lamk.) A. Rich. ex Walp.

A. chinensis (Lamk.) A. Rich. ex Walp. syn. *A. cadamba* (Roxb.) Miq., *A. indicus* A. Rich. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 51).

Isolation of cadambine, 3α-dihydrocadambine, 3β-dihydrocadambine, cadambagenic acid and oleanolic acid from bark (*Yunnan Zhiwu Yanjiu* 1990, *12*, 453; *Chem. Abstr.* 1991, *114*, 160767 f).

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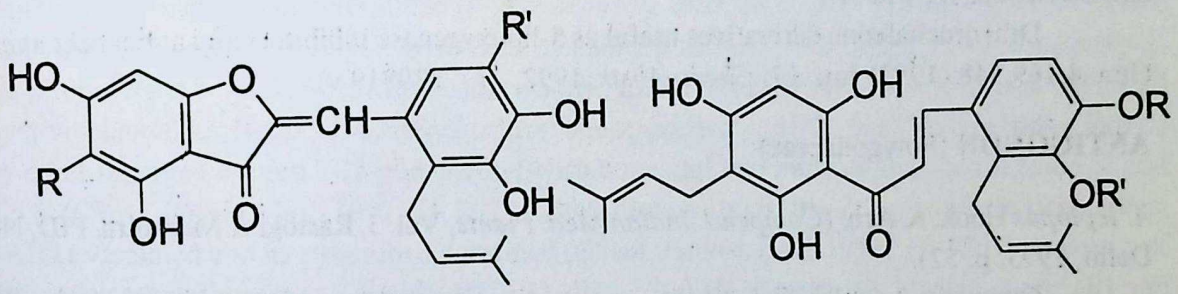
A. indicus A. Rich.; see *A. chinensis* (Lamk.) A. Rich. ex Walp.

ANTIARIS (Moraceae)

A. toxicaria (Pers.) Lesch. (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 37).

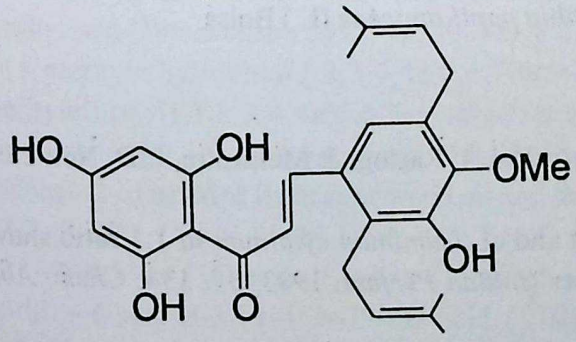
Two new prenylated aurones - antiarone A and antiarone B - isolated from bark and their structures determined (*Heterocycles* 1990, *30*, 1023); isolation and structure elucidation of three new prenylchalcones - antiarones C, D and E - and four new prenylflavanones - antiarones F, G, H and I - from root bark; sigmoidin A also isolated (*Heterocycles* 1990, *31*, 1315); two new dihydrochalcones - antiarones J and K - isolated from root bark and their structures determined; crystal structure of antiarone K established (*J. Nat. Prod.* 1991, *54*, 1049); isolation of a dihydrochalcone derivative (I) and antiarones J and K from root bark (Jpn. 4,169,548 (1992) Jun. 17; *Chem. Abstr.* 1992, *117*, 239819 v).

NEW COMPOUNDS

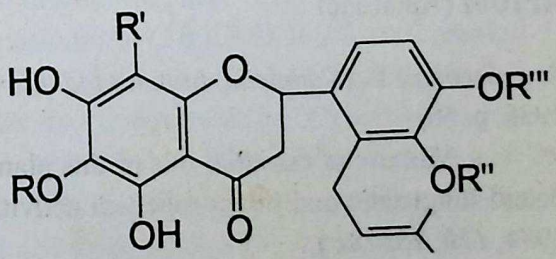


Antiarone A
R = H, R' = $CH_2CH{=}CMe_2$
Antiarone B
R = $CH_2CH{=}CMe_2$, R' = H

Antiarone C
R = Me, R' = H
Antiarone D
R = H, R' = Me



Antiarone E



Antiarone F
R,R' = H, R'',R''' = Me
Antiarone G
R,R''' = H, R' = $CH_2CH{=}CMe_2$, R'' = Me
Antiarone H
R = $CH_2CH{=}CMe_2$, R',R''= H, R''' = Me

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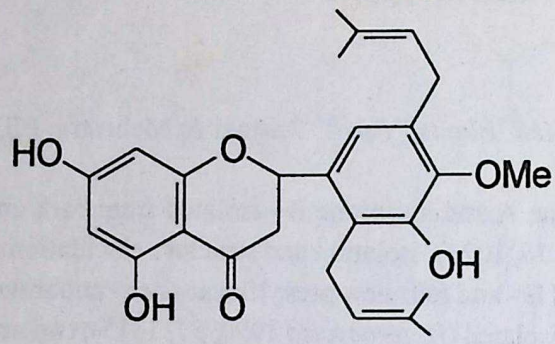
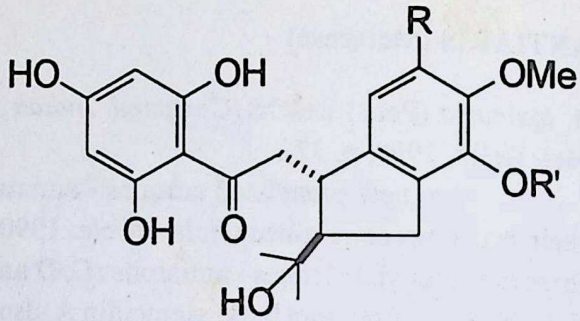


Antiarone I



Antiarone J
R = $CH_2CH{=}CMe_2$, R' = H
Antiarone K
R = H, R' = Me
I
R,R' = H

BIOLOGICAL ACTIVITY

Dihydrochalcone derivatives useful as 5-lipoxygenase inhibitors and anticancer agents (Jpn. 4,169,548 (1992) Jun. 17; *Chem. Abstr.* 1992, *117*, 239819 v).

ANTIGONON (Polygonaceae)

A. leptopus Hook. & Arn. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 52).

Quercetin-3-O-rhamnosylrhamnoside isolated from flowers (*J. Inst. Chemists*, Calcutta, 1992, *64*, 38; *Chem. Abstr.* 1994, *120*, 50093 z).

ANTIRRHINUM (Scrophulariaceae)

A. glaucum Stocks ex Wight; see *Schweinfurthia papilionaceae* (L.) Boiss.

APIUM (Apiaceae)

A. graveolens L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehtrotra, PID, New Delhi, 1995, p. 56).

Mixture of essential oils of this plant and of *Cuminum cyminum* in 1:1 ratio showed potent fungistatic and insect-repellent activities (*Indian Perfum.* 1993, *37*, 134; *Chem. Abstr.* 1994, *120*, 265782 j).

Determination of triglycerides (72.3), free fatty acid (5.5), 1-monoglycerides (2.5), 2-monoglycerides (4.0), 1:3-diglycerides (3.5), 1:2-diglycerides (3.0), sterols esters (1.0), phosphatidylethanolamine (1.0), lysophosphatidylethanolamine (1.0), phosphatidylinositol (10%) and phosphatidylcholine (tr) in oil by GC (*Proc. Pak. Acad. Sci.* 1989, *26*, 199; *Chem. Abstr.* 1990, *112*, 232537 q); limonene (72.16) and β-selinene (12.17%) determined in seed oil by GC-MS and GC/FTIR (*J. Essent. Oil Res.* 1990, *2*, 1; *Chem. Abstr.* 1990, *113*, 120591 s); fresh

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essential oil of ripe fruits found to contain more than 90% limonene, sedanolide, β-selinene, pentylcyclohexadiene and myrcene (*Egypt. J. Pharm. Sci.* 1990, *31*, 107; *Chem. Abstr.* 1990, *113*, 74791 g).

A. leptophyllum (Pers.) Muell. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 55).

Volatile oil showed strong antifungal activity and moderate antimicrobial activity (*Zagazig J. Pharm. Sci.* 1992, *1*, 55; *Chem. Abstr.* 1994, *121*, 5105 q).

A. petroselinum L.; see *Petroselinum crispum* (Mill.) A.W. Hill

AQUILARIA (Thymelaeaceae)

A. agallocha Roxb. (*Compend. Indian. Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.57).

Two new tri-2-(phenylethyl)chromones - AH19a and AH19b - isolated from agarwood and their stereostructures determined (*Phytochemistry* 1989, *28*, 3548); isolation of AH17, AH20 and AH23; structures of AH17 and AH23 elucidated as 5α,6β,7β-trihydroxy-8α-methoxy-2-(2-phenylethyl)-5,6,7,8-tetrahydrochromone and 5α,6β,7β,8α-tetrahydroxy-2-[2-(2'-hydroxyphenyl)ethyl]-5,6,7,8-tetrahydrochromone respectively; AH20 found to be a trimer formed by ether linkage between 2-(2-phenylethyl)chromone and two mols of agarotetrol at C5,8' and C6,5' (*Chem. Pharm. Bull.* 1991, *39*, 207); a new dioxan-linked bis-2(2-phenylethyl)chromone - AH21 - isolated and its structure determined (*Chem. Pharm. Bull.* 1991, *39*, 1869); isolation of three new sesquiterpenes - (-)guaia-1(10),11-dien-15-al (I), (-)selina-3,11-dien-9-one (II) and (+)selina-3,11-dien-9-ol (III) - from agar wood and their structure determination (*Phytochemistry* 1991, *30* 563); two new phenylethyl chromone derivatives isolated and characterised as (5S,6R,7S,8R,7'R)7'-hydroxy-isoagarotetrol and its 7'(S) - isomer (*Chem. Pharm. Bull.* 1992, *40*, 778); (-)guaia-1(10),11-dien-15,2-olide and (-) 2α-hydroxyguaia-1(10),11-dien-15-oic acid synthesised (*Tetrahedron* 1992, *48*, 10265); six new norsesquiterpenoids - IV, V, (S)4a-methyl-2-(1-methylethylidene)-1,2,3,4,4a,5,6,7-octahydronaphthalene, (2R,4aS)4a-methyl-2-(1-methylethenyl)-1,2,3,4,4a,5,6,7-octahydronaphthalene, (1R,6S,9R)6,10,10-trimethyl-11-oxatricyclo(7.2.1.0)dodecane and (1R,2R,6S,9R)6,10,10-trimethyl-11-oxatricyclo(7.2.1.0) dodecan-2-ol isolated from agar wood oil and their structures established (*Flavour Fragrance J.* 1992, *7*, 295; *Chem. Abstr.* 1993, *119*, 55673 c); two new sesquiterpene aldehydes - (-)selina-3,11-dien-14-al (VI) and (+)selina 4,11-dien-14-al (VII) -, three new sesquiterpene carboxylic acids - (-)selina-3,11-dien-14-oic acid (VIII), (-)selina—4,11-dien-14-oic acid (IX) and 9-hydroxyselina-4,11-dien-14-oic acid (X) - isolated as methyl esters, and a new norsesquiterpene ketone - (+)1,5-epoxynor-ketoguaiene - isolated from agar wood and their structures determined (*Phytochemistry* 1993, *33*, 1147); (1R,2R,6S,9R)epoxy-β-agarofuran (XI), (E)8,10-undecadien-2-one (XII) and another compound (XIII) isolated from oil and their structures confirmed by synthesis (*Flavour Fragrance J.* 1993, *8*, 307; *Chem. Abstr.* 1994, *120*, 330784 c).

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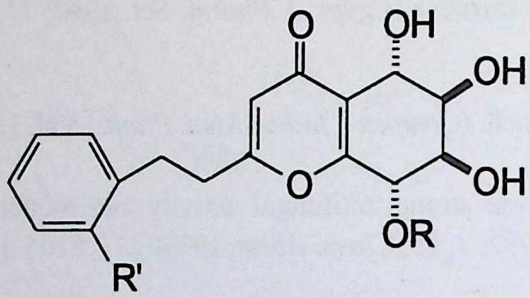
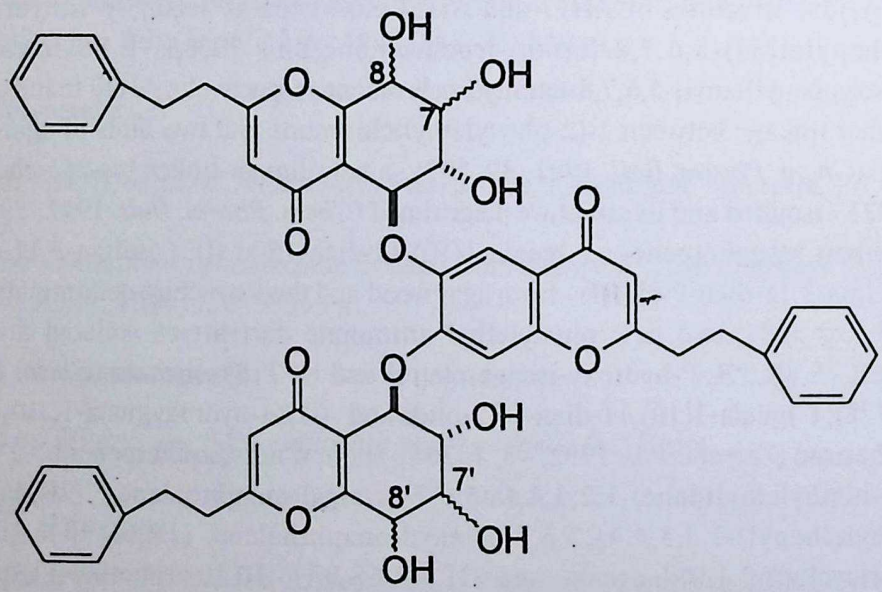


AH17
R = Me, R' = H
AH23
R = H, R' = OH



AH19a [5S, 6S, 7R, 8S]
7,8' ~~ = β, 7',8~~ = α
AH19b [5S, 6S, 7S, 8R]
7,8' ~~ = α, 7',8 ~~ = β

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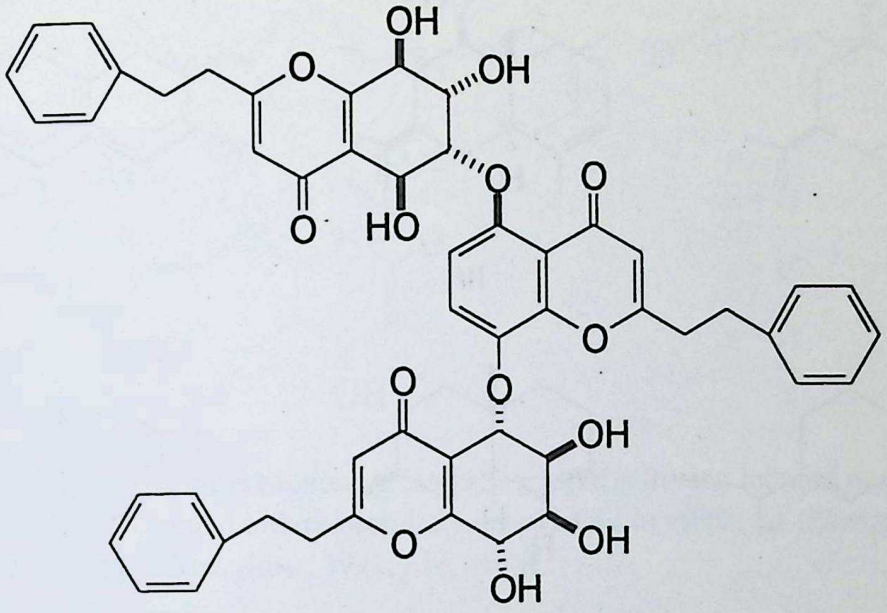
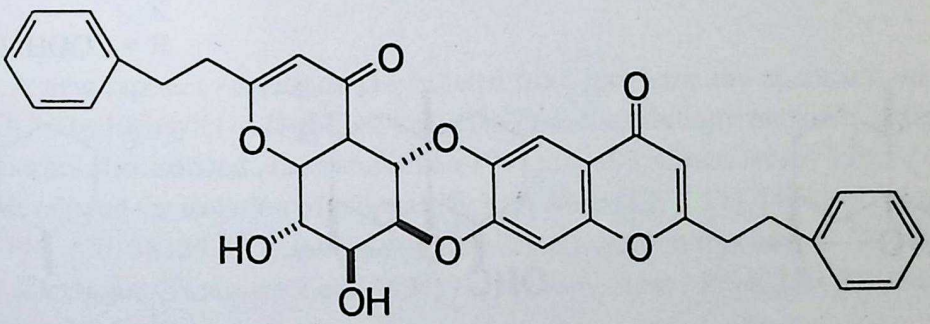
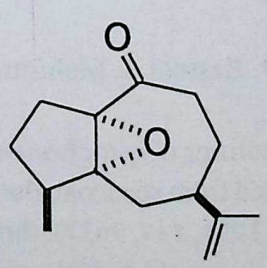


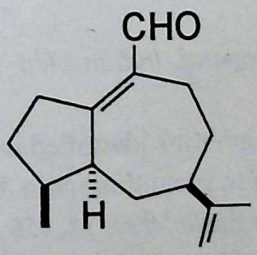
AH20



AH21



(+)1,5-Epoxy-nor-ketoguaiene



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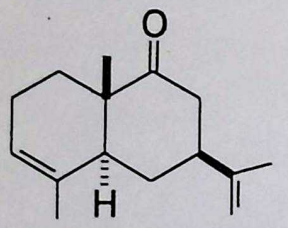

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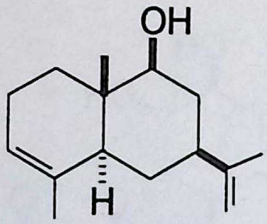

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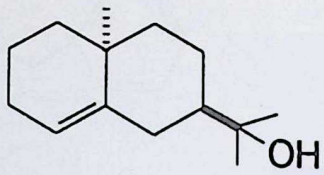

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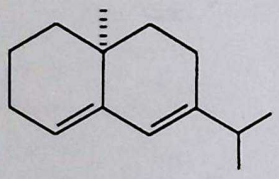

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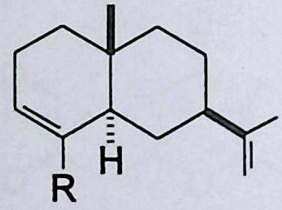
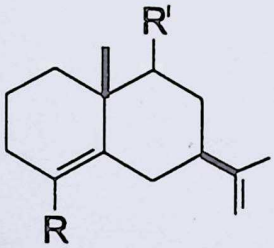
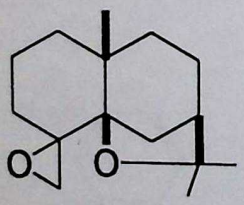


VI
R = CHO
VIII
R = COOH



VII
R = CHO, R' = H
IX
R = COOH, R' = H
X
R = COOH, R' = OH



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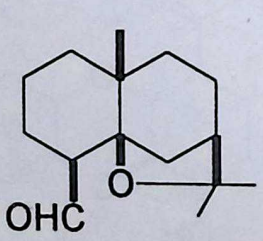

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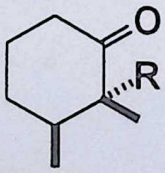

XIII
R = $CH_2CH{=}CMe_2$

ARACHIS (Papilionaceae)

A. hypogaea L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 56).

N^6-Methylagmatine identified in seeds and seedlings (*Phytochemistry* 1990,.*29*, 1313); compound (I) similar to proanthocyanin A dimer, isolated from seedcoat along with (+) catechin (*Zhongguo Zhongyao Zazhi* 1990, *15*, 356; *Chem. Abstr.* 1991, *114*, 363 t); three new phytoalexins (II, III and IV) isolated from leaves infected with *Puccinia arachidis* (*Oleagineux* 1991, *46*, 501; *Chem. Abstr.* 1992, *116*, 252152 w).

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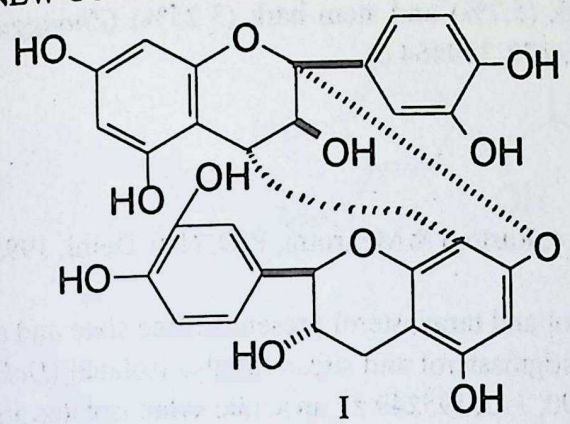
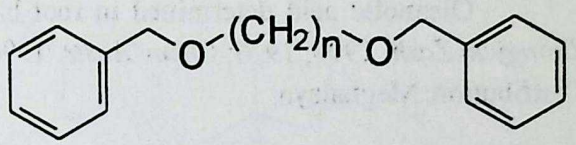
NEW COMPOUNDS



I



II
n = 11
III
n = 12
IV
n = 13

BIOLOGICAL ACTIVITY

Compound (I) lowered blood pressure temporarily in rats, reduced muscle tension of rabbit intestine *in vitro* and induced capillary constriction in rabbit ear (*Zhongguo Zhongyao Zazhi* 1990, *15*, 356; *Chem. Abstr.* 1991, *114*, 363 t).

ARALIA (Araliaceae)

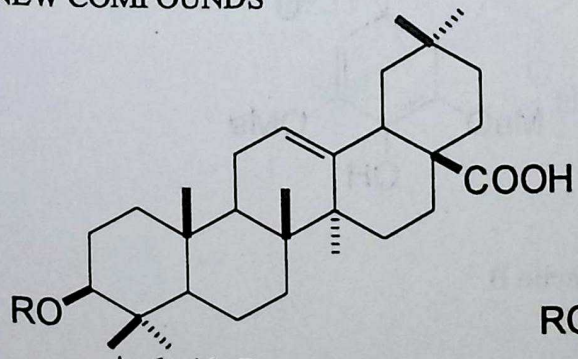
A. bipinnatifida (Seem.) Clarke; see *Panax pseudoginseng* Wall. ssp. *himalaicus* Hara var. *bipinnatifidus* (Seem.) Li

A. chinensis L.

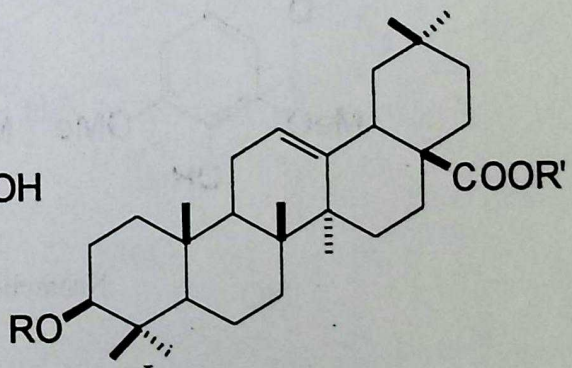
A new saponin - araloside D - isolated from root bark and characterised as oleanolic acid-3-O-β-D-glucosyl(1→2)-β-D-xylosyl(1→2)-α-L-arabinopyranoside; araloside A and narcissiflorine also isolated (*Yaoxue Xuebao* 1991, *26*, 197; *Chem. Abstr.* 1991, *115*, 89111 a); process developed for isolation of saponin (I) from wood (CN 1,073,449 (1993) Jun. 23; *Chem. Abstr.* 1994, *120*, 38125 d); determination of oleanolic acid in root bark (5.7%) and stem bark (3.25%) (*Zhongguo Zhongyao Zazhi* 1994, *19*, 6; *Chem. Abstr.* 1994, *120*, 319464 c).

Distribution: Meghalaya.

NEW COMPOUNDS



Araloside D
R = Ara(2→1)Xyl(2→1)Glu



I
R = Gluc.acid(4→1)Ara,
R' = Ara(2→1)Ara(2→1)Glu

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A. dasyphylla Miq.

Oleanolic acid determined in root bark (5.7%) and stem bark (3.25%) (*Zhongguo Zhongyao Zazhi* 1994, *19*, 6; *Chem. Abstr.* 1994, *120*, 319464 c).

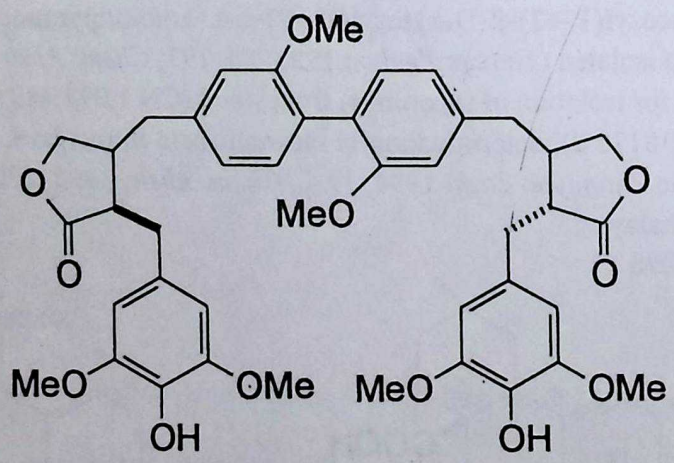
Distribution: Meghalaya.

ARCTIUM (Asteraceae)

A. lappa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 61).

Lupeol, α and β-amyrins, ψ-taraxasterol and taraxasterol present in free state and as acetates and esters with long chain fatty acids; stigmasterol and sitosterol also isolated (*Dokl. Bolq. Akad. Nauk* 1989, *42*, 43; *Chem. Abstr.* 1990, *112*, 195249 z); an acidic xylan isolated and partially characterised (*Agric. Biol. Chem.* 1991, *55*, 1139); isolation and characterisation of a xyloglucan consisting of oligosaccharide units of hepta-Glu:Xyl (4:3), nona-Glu:Xyl:Gal:Fuc (4:3:2:1) and deca-Glu:Xyl:Gal:Fuc (4:3:2:1) saccharides (*Biosci., Biotechnol., Biochem.* 1993, *57*, 1591; *Chem. Abstr.* 1994, *120*, 4686 x); five new differentiation-including lignans - arctignans A, B, C, D and E - isolated from fruits and their structures determined; two known lignans, eight sesquilignans and three dilignans also isolated (*Chem. Pharm. Bull.* 1993, *41*, 1774); a new lignan - neoarctin B - isolated from seeds and its structure established; daucosterol; arctigenin, arctiin, matairesinol and lappaol also isolated (*Yaoxue Xuebao* 1993, *28*, 911; *Chem. Abstr.* 1994, *121*, 31078 c).

NEW COMPOUNDS



Neoarctin B

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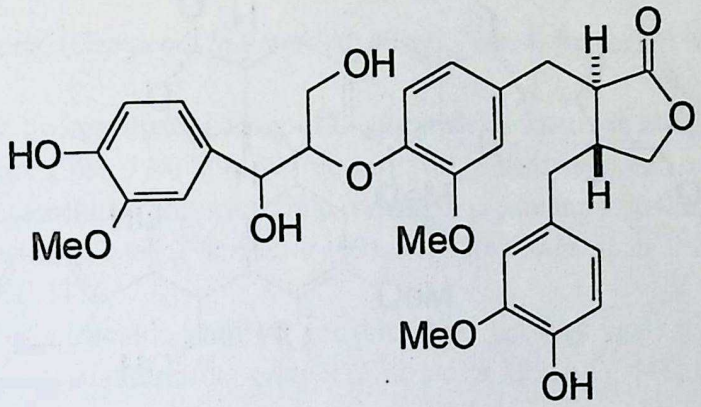
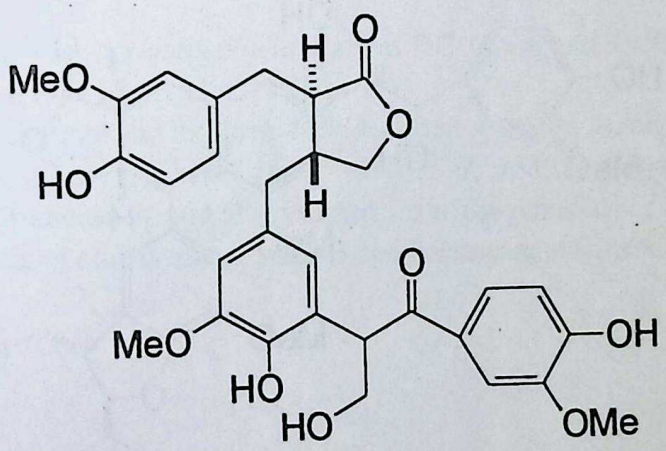
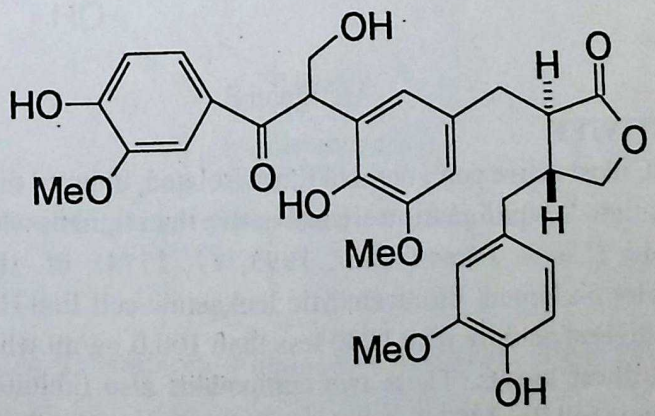


Arctignan A



Arctignan B



Arctignan C

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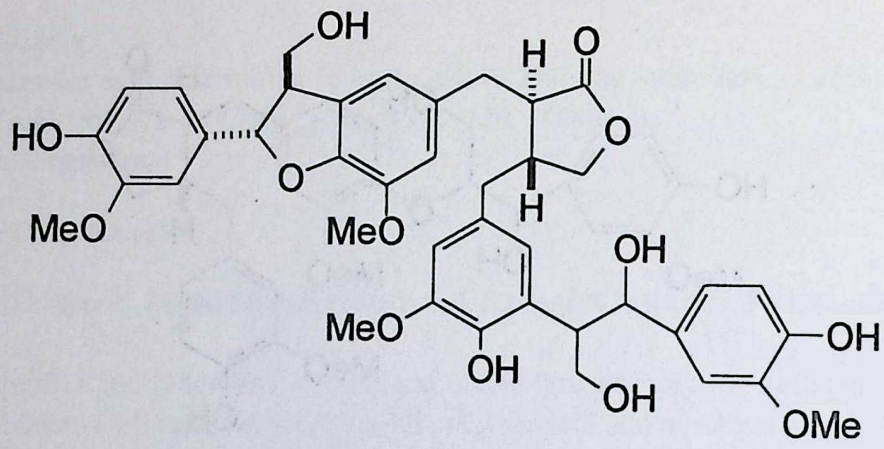
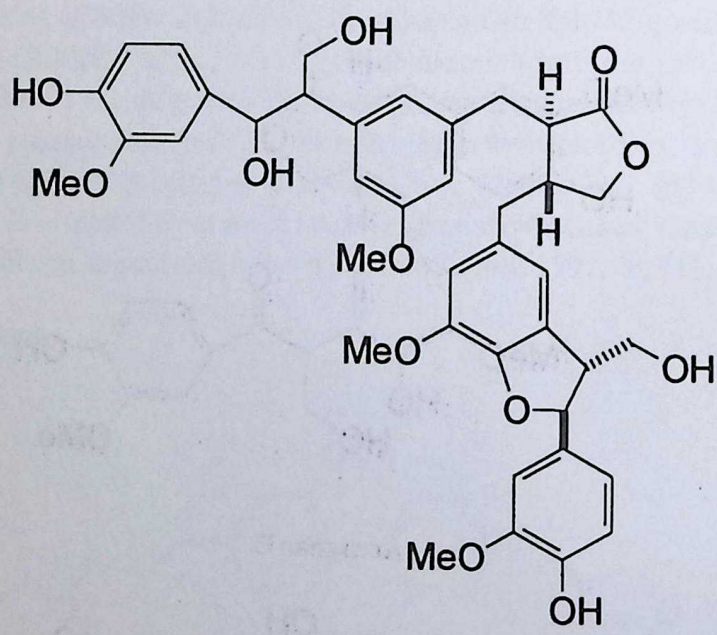


Arctignan D



Arctignan E

BIOLOGICAL ACTIVITY

Arctigenin, most active compound of those isolated, induced differentiation of MI cells at 0.5 μM concentration. Sesquilignans were less active than lignans whereas dilignans showed even weaker activity (*Chem. Pharm. Bull.* 1993, *41*, 1774); of the lignans assayed for antileukaemic activity on human promyelocytic leukaemic cell line HL-60, matairesinol and arctigenin showed highest activity with IC50 less than 100.0 ng/ml which was equal to that of currently used anticancer agents. These two compounds also inhibited growth of human T lymphocytic leukaemia cell line MOLT-4, but showed little or no inhibition of mutagen-induced blastogenesis of human peripheral blood lymphocytes. Lignans strongly suppressed incorporation of [3H]thymidine, [3H]uridine and [3H]leucine into HL-60 cells (*Life Sci.* 1994, *55*, 1061).

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ARCTOSTAPHYLOS (Ericaceae)

A. uva-ursi (L.) Spreng. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 62).

Piceoside (4-hydroxyacetophenone-β-D-glucoside) isolated from twigs (*Pharmazie* 1990, *45*, 446; *Chem. Abstr.* 1990, *113*, 2083394 r); salicylic, p-hydroxybenzoic, melilotic, vanillic, gentisic, homoprotocatechuic, protocatechuic, syringic, p-coumaric, gallic, isoferulic, ferulic, caffeic and sinapic acids isolated (*Pharmazie* 1991, *46*, 680; *Chem. Abstr.* 1992, *116*, 102727 x).

BIOLOGICAL ACTIVITY

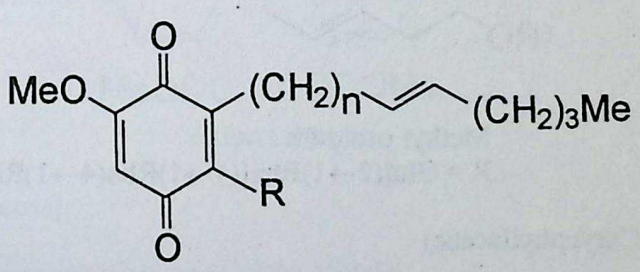
Aglycone of piceoside showed antimicrobial activity against *Proteus vulgaris, Enterobacter aerogenes* and *Bacillus subtilis* (*Pharmazie* 1990, *45*, 446; *Chem. Abstr.* 1990, *113*, 208394 r).

ARDISIA (Myrisinaceae)

A. japonica (Horn.) Bl. syn. *A. odontophylla* Wall. ex DC. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 57).

Borneol, β-eudesmol and terpinen-4-ol identified as major constituents of essential oil (*Zhongcaoyao* 1989, *20*, 437; *Chem. Abstr.* 1990, *112*, 95525 t); two new alkenyl-1,4-benzoquinones - ardisianones A and B - isolated from rhizomes along with maesanin and characterised; synthesis of ardisianones A and B and belamcandol (*Chem. Pharm. Bull.* 1993, *41*, 561).

NEW COMPOUNDS



Ardisianone A
R = H, n = 9
Ardisianone B
R = OH, n = 7

A. odontophylla Wall. ex DC.; see *A. japonica* (Horn.) Bl.

ARECA (Arecaceae)

A. catechu L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 63).

Phenolic compound for preventing dental caries and gingivitis isolated (Jpn. 3,77,818 (1991) Apr. 03; *Chem. Abstr.* 1991, *115*, 142241 w).

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Phthalic, lauric, myristic, palmitic and stearic acids and bis(2-ethylhexyl) ester isolated (*Bangladesh J. Sci. Ind. Res.* 1989, *24*, 146; *Chem. Abstr.* 1991, *114*, 139789 e).

BIOLOGICAL ACTIVITY

Arecoline administered s.c. to alloxan-diabetic rabbits at 0.20 and 0.25 mg/kg doses, produced hypoglycaemia which lasted for 4 to 6 hr (*Indian J. Exp. Biol.* 1993, *31*, 474).

ARECASTRUM (Arecaceae)

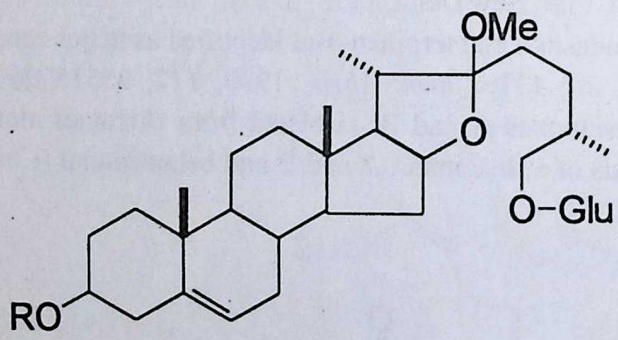
A. romanzoffianum (Cham.) Becc.

Eng.- Feathery coconut palm, Queen palm.

Glucoluteolin and methyl proto-Pb isolated from leaves (*Chem. Pharm. Bull.* 1991, *39*, 1455).

Distribution: Native to Brazil, introduced into Indian gardens.

NEW COMPOUNDS



Methyl proto-Pb
R = Glu[(2→1)Rha](4→1)Rha(4→1)Rha

ARENARIA (Caryophyllaceae)

A. kansuensis Maxim. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 63).

Isolation and structure determination of a new steroid - 22,23-dihydrospinasterol palmitate; 22,23-dihydrospinasterol, 22,23-dihydrospinasterone, ergosterol-5,8-peroxide, 24-methylene-22,23-dihydrolanosterol, zeorin, fernenone, β-sitosterol-3-O-β-D-glucoside, tricin, (+)isoscoparin and (-)isoscoparin also isolated (*Chem. Pharm. Bull.* 1990, *38*, 2281).

ARGEMONE (Papaveraceae)

A. mexicana L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 64).

Flowers afforded cryptopine and β-sitosterol (*Indian J. Chem.* 1992, *31B*, 133).

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ARGYREIA (Convolvulaceae)

A. nervosa (Burm.f.) Boj. syn. *A. speciosa* (L.f.) Sweet (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 64).

Quercetin, kaempferol and its 3-O-rhamnoside isolated from leaves (*J. Indian Chem. Soc.* 1992, *69*, 110); two new glycoside isolated from leaves and characterised as 5-O-α-rhamnoside and 5-O-β-glucoside of 7,8,3',4',5'-pentahydroxyflavone (*J. Chem. Res. Synop.* 1993, 248; *Chem. Abstr.* 1993, *119*, 177605 c).

A. speciosa (L.f.) Sweet; see *A. nervosa* (Burm.f.) Boj.

ARISAEMA (Araceae)

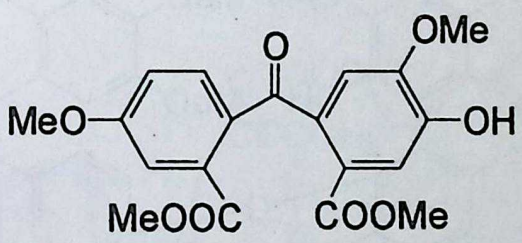
A. exile Schott; see *A. jacquemontii* Blume

A. jacquemontii Blume syn. *A. exile* Schott

An anticancer compound - ariseminone - isolated and its structure determined (*Pakistan J. Sci. Ind. Res.* 1992, *35*, 406; *Chem. Abstr.* 1993, 119, 124990 t).

Distribution: Himalayas, from Kashmir to Bhutan, alt. 2100-3600 m.

NEW COMPOUNDS



Ariseminone

ARISTEGA (Menispermaceae)

A. laevifolia Miers; see *Tiliacora triandra* (Colebr.) Diels

ARISTOLOCHIA (Aristolochiaceae)

A. bracteata Retz.; see *A. bracteolata* Lamk.

A. bracteolata Lamk. syn. *A. bracteata* Retz. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 65).

Magnoflorine and aristolochic acid-1 isolated from seeds (*Int. J. Pharmacog.* 1991, *29*, 101; *Chem. Abstr.* 1991, *115*, 269858 h).

BIOLOGICAL ACTIVITY

Magnoflorine decreased arterial blood pressure in rabbits and induced hypothermia in mice. Both magnoflorine and aristolochic acid-1 induced contractions in isolated uterus of

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pregnant rat and stimulated isolated ileum of guinea pig (*Int. J. Pharmacog.* 1991, *29*, 101; *Chem. Abstr.* 1991, *115*, 269858 h).

A. elegans Mast.; see *A. littoralis* Parodi

A. grandiflora Sw.

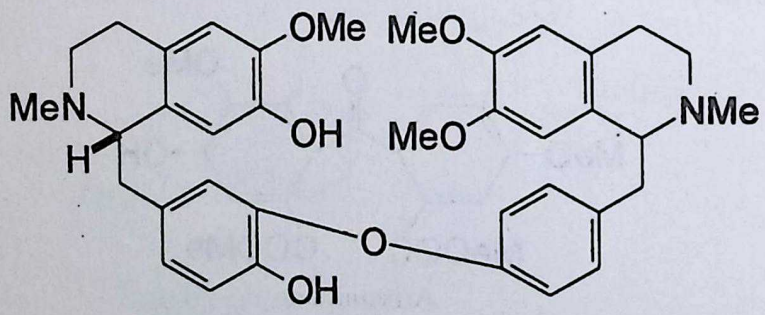
Eng.- Pelican flower, Poison hogmeat.

N-2(4-Hydroxyphenyl)ethylcoumaramide as its diacetyl derivative, methyl esters of pentadecanoic, 14-methyl-9-octadecenoic and 16-methylheptadecanoic acids, ethyl esters of hexadecanoic and 9-octadecenoic acids and β-sitosterol isolated (*Fitoterapia* 1992, *63*, 275).
Distribution: Native to Guatemala, introduced into Indian gardens.

A. littoralis Parodi syn. *A. elegans* Mast.

Eng.- Calico flower.

A new bisbenzylisoquinoline alkaloid - (-)temuconine - isolated from Egyptian plant (*J. Nat. Prod.* 1989, *52*, 1374).
Distribution: Native of Brazil, introduced into Indian gardens.
NEW COMPOUNDS



(-) Temuconine

A. ringens Vahl

Identification of limonene, p-cymene, β-caryophyllene and α-phellandrene by GC-MS (*An. Asoc. Quim. Argent.* 1990, *78*, 355; *Chem. Abstr.* 1993, *118*, 19196 v).
Distribution: Native to Brazil, introduced into Indian gardens.

ARNEBIA (Boraginaceae)

A. euchroma (Royle) Johnston var. *euchroma* syn. *Macrotomia perennis* (Schrenk) Boiss., *M. euchroma* (Royle) Paulsen, *Lithospermum euchromon* Royle (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 66).

Two caffeic acid tetramers (I and II) isolated from roots, shown to have enantiomeric 1,2-dihydro-6,7-dihydroxy-1-(3',4'-dihydroxyphenyl)naphthalene-2,3-dicarboxylic acid (caffeic acid dimer) moieties linked to two molecules of 3-(3',4'-dihydroxyphenyl)-(R)-lactic acid; I was found to be identical with rabdosiin (*Phytochemistry* 1990, *29*, 2645); isolation of deoxyshikonin,

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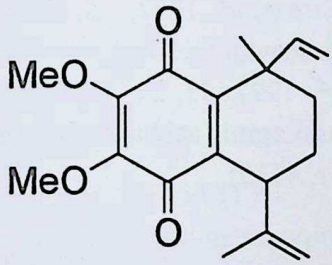
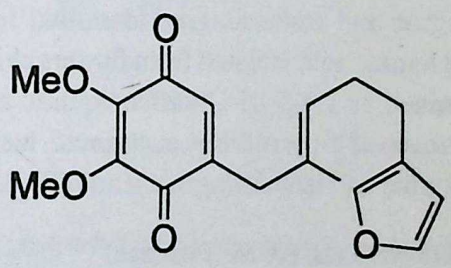
β,β-dimethylacrylshikonin, acetylshikonin, tetracrylshikonin, shikonin and β-hydroxy-isovalerylshikonin from roots (*Zhongcaoyao* 1991, *22*, 202; *Chem. Abstr.* 1991, *115*, 203304 t); three phenolics, arnebinol, shikonofuran and de-O-methyllasiodiplodin isolated from roots (*Chem. Pharm. Bull.* 1991, *39*, 2956); isolation of two quinones - arnebinone and arnebifuranone - from roots and their structure elucidation (*Chem. Pharm. Bull.* 1991, *39*, 2962); isolation of tormentic and 2α-hydroxyursolic acids (*Planta Med.* 1992, *58*, 227); O^7- and O^9-angeloyl retronecines isolated (*Planta Med.* 1993, *59*, 192); four anticomplementary polysaccharides - LR-2IId-1a, LR-2IId-1b, LR-2IId-3a and LR-2IId-5a - consisting mainly of mannose, galactose, glucose and glucuronic acid in addition to rhamnose, fucose and arabinose isolated from the acidic polysaccharide fraction (LR-2) of roots (*Phytochemistry* 1993, *34*, 719).

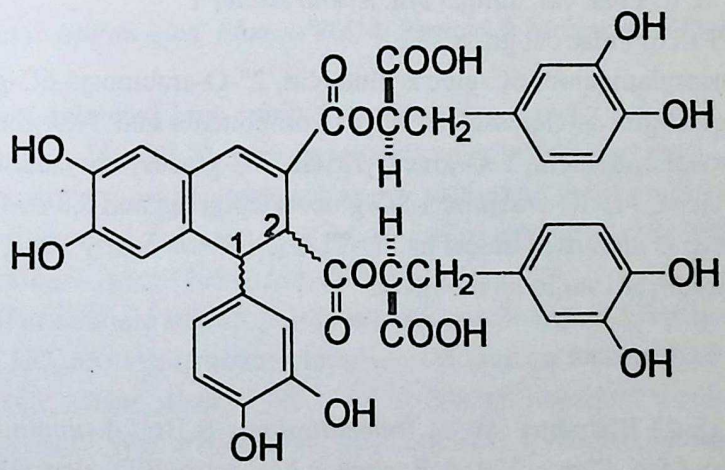
NEW COMPOUNDS



Arnebinone



Arnebifuranone



I
~~ = 1α, 2β
II
~~ = 1β, 2α

BIOLOGICAL ACTIVITY

Arnębinol, shikonofuran and de-O-methyllasiodiplodin inhibited prostaglandin biosynthesis *in vitro* (*Chem. Pharm. Bull.* 1991, *39*, 2956); acetylshikonin, tetracrylshikonin, β,β-dimethylacrylshikonin and shikonin inhibited aggregation of washed rabbit platelets caused by collagen, arachidonic acid, platelet-activating factor, HDP or thrombin, with IC50 2.1 μM, 2.8 μM, 4.2 μM and 10.7 μM respectivily. In rat aorta, acetylshikonin and shikonin inhibited

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high potassium and norepinephrine-induced contractions while β,β-dimethylacrylshikonin and tetracrylshikonin potentiated phasic contraction caused by norepinephrine (*Planta Med.* 1993, *59*, 401).

ARNICA (Asteraceae)

A. montana L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 67).

Two new glycosides isolated from flowers and characterised as betuletol-3-O-β-glucoside and quercetagetin-6,3',4'-trimethyl ether-3-O-β-glucoside; pectolinarigenin-7-O-β-glucoside and 3,7-di-O-β-glucosides of quercetin and patuletin also isolated (*Planta Med.* 1992, *58*, 355); tussilagine and isotussilagine identified in flowerheads (*Planta Med.* 1992, *58*, 556); a new caffeoylquinic acid isolated from flowers along with 1,5-di-O-caffeoylquinic acid and its structure determined as 1,4,5-tri-O-caffeoylquinic acid (*Phytochemistry* 1992, *31*, 2111); flower heads also contained 2-pyrrolidine acetic acid, tussilaginic acid, isotussilaginic acid and C-1 epimers of tussilaginic and isotussilaginic acids (*Phytochemistry* 1992, *31*, 4135).

ARRHENATHERUM (Poaceae)

A. elatius (L.) J. & C. Presl var. *elatius* syn. *Avena elatior* L.

Eng. - Tall or False oat grass.

6C-Glucosylapigenin, 6C-glucosylluteolin, 2"-O-arabinosyl-6C-glucosylapigenin and 2"-O-arabinosyl-6C-glucosylluteolin as major components and 7-O-glucosides of apigenin, luteolin, chrysoeriol and tricin, 5-O-glucosyltricin, 6C-glucosylchrysoeriol, 6C-glucosyl-7-O-methylluteolin, vicenin 1, 6C-arabinosyl-8C-glucosylapigenin and 6,8-di-C-arabinosylapigenin as minor components identified in leaf by 2D-TLC (*Phytochemistry* 1989, *28*, 3035).
Distribution: Introduced into India in Assam.

ARTABOTRYS (Annonaceae)

A. hexapetalus (L.f.) Bhandari syn. *A. odoratissimus* R.Br., *A. uncinatus* (Lamk.) Merrill (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 68).

Confirmation of structures of yingzhaosu C and D (*Sci. China* 1989, *32*B, 800; *Chem. Abstr.* 1990, *112*, 119133 s); total synthesis of (+)yingzhaosu A (*Tetrahedron Lett.* 1991, *32*, 5785); stem bark afforted β-sitosterol, stigmasterol, benzyl benzoate and asimilobine (*J. Bangladesh Acad. Sci.* 1991, *15*, 59; *Chem. Abstr.* 1991, *115*, 119899 h); stem bark also yielded spathulenol, norstephalagine, isopiline, anonaine, atherospermidine, liriodenine and N-methylcoclaurine (*Fitoterapia* 1994, *65*, 92).

A. odoratissimus R.Br.; see *A. hexapetalus* (L.f.) Bhandari

A. uncinatus (Lamk.) Merrill; see *A. hexapetalus* (L.f.) Bhandari

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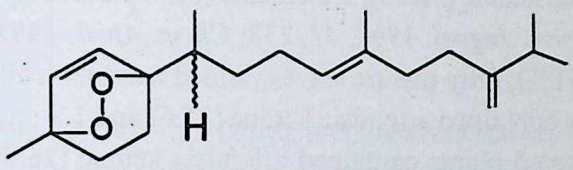
ARTEMISIA (Asteraceae)

A. absinthium L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 68).

Kaempferol, its 3-methyl ether and quercetagetin-3,6,3'-trimethyl, -3,6,7-trimethyl, -3,6,7,3'-tetramethyl and -3,6,7,3'4'-pentamethyl ethers isolated (*Fitoterapia* 1989, *60*, 460); two new diastereomeric homoditerpene peroxides (I and II) isolated from aerial parts and characterised (*Phytochemistry* 1992, 31, 340).

NEW COMPOUNDS



I, II

BIOLOGICAL ACTIVITY

Mixture of diastereomeric homoditerpene peroxides exhibited antimalarial activity *in vitro* with EC50 of 1.0 μg/ml (*Phytochemistry* 1992, *31*, 340).

A. annua L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 69).

Plant extract exhibited high inhibition of tobacco viruses (*Plant Sci.* 1991, *75*, 161; *Chem. Abstr.* 1991, *115*, 110632 h); various extracts of plant showed marked antipyretic and anti-inflammatory activities and also some antinociceptive and antibacterial actions; artemisic acid identified as antibacterial and scopoletin as anti-inflammatory agents (*Zhongguo Zhongyao Zazhi* 1993, *18*, 44; *Chem. Abstr.* 1993, *118*, 247155 m).

Isolation of arteannuic acid from leaves (*Han'guk Nonghwa Hakhoechi* 1989, *32*, 178; *Chem. Abstr.* 1990, *112*, 4580 t); structure elucidation of arteannuin D and its synthesis (*Huaxue Xuebao* 1989, *47*, 340; *Chem. Abstr.* 1990, *112*, 36202 n); improved method for isolation of artemisinin from leaves (*J. Nat. Prod.* 1990, *53*, 1560; US 4,952,603 (1990) Aug. 28; *Chem. Abstr.* 1991, *114*, 12187 b); stereoselective synthesis of artemissinin (*Tetrahedron Lett.* 1990, *31*, 755; *Curr. Sci.* 1994, *66*, 35); identification of camphor, 1,8-cineole, artemisiaketone and β-farnesene in essential oil of Vietnamese plant by GC-MS (*Tap Chi Hoa Hoc* 1990, *28*, 11; *Chem. Abstr.* 1991, *115*, 189455 j); isolation of nonacosanol, 2-methyltricosan-8-one-23-ol, hentriacontanyl triacontanoate and 2,29-dimethyltriacontane from leaves and stems (*J. Indian Chem. Soc.* 1990, *67*, 1004); axillarin, scopoletin, chrysosplenetin, chrysosplenol D, casticin, quercetin, its 3-rutinoside, luteolin, its 7-O-glycoside, kaempferol, its 6-methoxy derivative, 3-O-glycosides of kaempferol and quercetin, patuletin and its 3-O-glycoside isolated (*Pharmazie*

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1990, *45*, 382; *Chem. Abstr.* 1990, *113*, 112533 j); stigmasterol and sitosterol isolated (*Plant Sci.* 1991, *75*, 161; *Chem. Abstr.* 1991, *115*, 110632 h); isolation of plant growth inhibitors - ABA, Me-ABA and bis(1-hydroxy-2-methylpropyl)phthalate (*Indian Drugs* 1991, *28*, 376); synthesis of arteannuin from arteannuic acid (CN 1,053,237 (1991) Jul.24; *Chem. Abstr.* 1992, *116*, 174484 q); stereocontrolled total synthesis of qinghaosu and yingzhaosu A (*Newer Trends Essent. Oils Flavours, Sel. Pap. Int. Symp.* 1991, 43, *Chem. Abstr.* 1994, *121*, 231068 m); qinghaosu mother liquor after artemisin extraction, contained camphor (36.91), borneol (6.99), γ-cadinene (6.2) and cineole (4.53%) (*Yunnan Daxue Xuebao, Ziran Kexueban* 1991, *13*, 280; *Chem. Abstr.* 1994, *120*, 101921 c); fresh aerial parts contained 0.38% essential oil whereas air-dried aerial parts contained 1.10%; artemisia ketone (52.50), 1,8-cineole (11.66) and camphor (10.90%) determined in essential oil (*Acta Pharm. Jugosl.* 1991, *41*, 233; *Chem. Abstr.* 1992, *116*, 102677 g); leaves contained oil (0.84 to 1.51%); fully mature leaves yielded maximum oil. Oil from leaves of early summer-harvested plants contained artemisia ketone (35.6) and 1,8-cineole (28.1%) whereas oil from leaves of fall-harvested plants contained artemisia ketone (26.8) and camphor (20.5%); flower oil from fall-harvested plants contained artemisia ketone (56.0) and camphor (10.5%) (*J. Essent. Oil Res.* 1991, *3*, 33; *Chem. Abstr.* 1991, *114*, 192225 u); artemisinin G from leaves (*Planta Med.* 1992, *58*, 300); partial synthesis of (+)artemisinin and (+)deoxoartemisinin (*Tetrahedron Lett.* 1992, *33*, 1029); stereoselective total synthesis of (+)artemisinin (*J. Am. Chem. Soc.* 1992, *114*, 974); isolation of a new polyacetylene - annuadiepoxide - from aerial parts; ponticaepoxide also isolated (*J. Nat. Prod.* 1992, 55, 29); two new compounds isolated from aerial parts and characterised as 5-nonadecylresorcinol-3-O-methyl ether and dihydro-epideoxyarteannuin B (*J. Nat. Prod.* 1992, *55*, 1756); oil (4.0%) from plant grown in Netherlands from Chinese seeds contained artemisia ketone (63.9), artemisia alcohol (7.5), myrcene (5.1), α-guaiene (4.7) and camphor (3.3%) whereas oil (1.4%) from Vietnamese seeds contained camphor (21.8), germacrene D (18.3), β-caryophyllene (5.6), trans-β-farnesene (3.8) and 1,8-cineole (3.1%) (*Flavour Fragrance J.* 1993, *8*, 131; *Chem. Abstr.* 1993, *119*, 199550 h); artemisic acid and scopoletin identified in plant extract (*Zhongguo Zhongyao Zazhi* 1993, *18*, 44; *Chem. Abstr.* 1993, *118*, 247155 m); isolation of artemisinic acid and its crystal structure determination by X-ray analysis (*J. Nat. Prod.* 1993, *56*, 215); a new sesquiterpene lactone - annulide - isolated from aerial parts and its structure established; in addition, artemisia ketone, β-myrcene, trans-β-selinene, arteannuin B, artemisinin, arteannuic acid, epideoxyarteannuin B, sitosterol and stigmasterol isolated (*Phytochemistry* 1993, *32*, 391); a bisnor-cadinane - norannuic acid - isolated from aerial parts and its structure determined by 2D NMR and mass spectrometry; ^{13}C-NMR assignments of β-arteether corrected (*Phytochemistry* 1993, *33*, 1461); improved method for isolation of qinghao acid (artemisinic acid) (*Planta Med.* 1993, *59*, 562); total synthesis of (+)qinghaosu (*Tetrahedron Lett.* 1993, *34*, 4435); isolation of a novel diterpene - phytene-1,2-diol - and its structure elucidation (*Phytochemistry* 1994, *36*, 1553).

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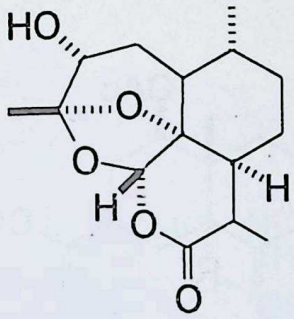
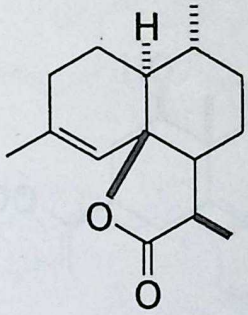
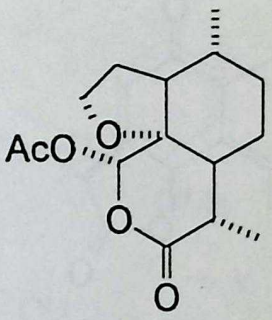


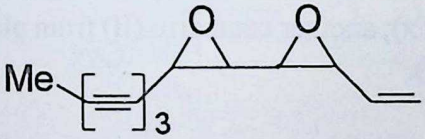
Arteannuin D



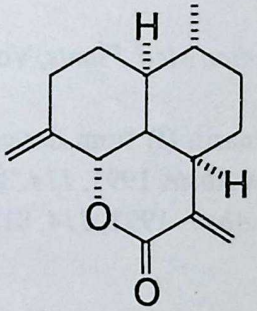
Dihydro-epideoxyarteannuin B



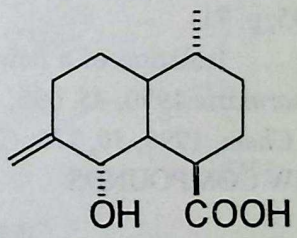
Artemisinin G



Annuadiepoxide



Annulide



Norannuic acid

BIOLOGICAL ACTIVITY

Bis-(1-hydroxy-2-methylpropyl)phthalate inhibited germination of wheat coleoptile and mustard seed *(Indian Drugs* 1991, *28*, 376); cytotoxicity of artemisinin, artemetin, deoxyartemisinin, artemisinic acid, arteannuin B and quercetagetin-6,7,3',4'-tetramethyl ether was tested *in vitro* on several human tumor cell lines; artemisinin and quercetagetin-6,7,3',4'-tetramethyl ether exihibited significant cytotoxicity against P-388, A-549, HT-29, MCF-7 and KB tumor cells (*Planta Med.* 1994, *60*, 54).

A. biennis Willd. syn. *A. tournefortiana* Reichb.

A new cis-eudesmanolide (I) and three new eudesmane acids (II,III and IV) isolated from aerial parts and characterised as 9-oxo-11β,13-dihydrotournefortiolide (9-oxoeudesm-4-en-6α-H,7α-H,11β-H-12,6-olide), 9β-hydroxyeudesma-4,11(13)-dien-7α-H-12-oic acid, 9β-acetoxy-5α-hydroxyeudesma-4(15),11(13)-dien-7α-H-12-oic acid (9β-acetoxy-5α-hydroxy-costic acid) and 9β-acetoxycostic acid respectively; ilicic acid and 9-oxo-eudesm-4-en-6α-H,7α-H,11α-H-12,6-olide also isolated (*Ann. Chem.* 1990, 541).

Distribution: Himalayas, from Kashmir to Kumaon, alt. 2400-4500 m.

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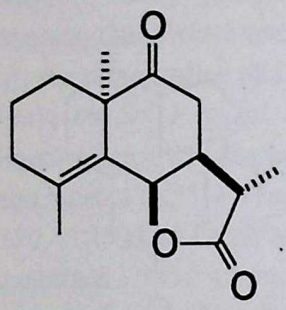
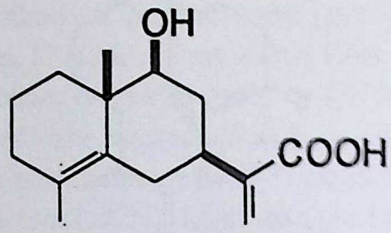
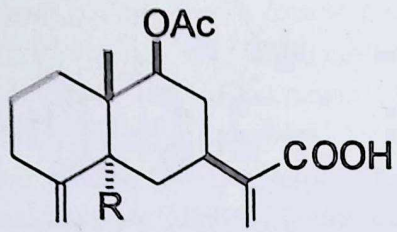


I



II



III
R = OH
IV
R = H

A. capillaris Thunb.; see *A. scoparia* Waldst. & Kit.

A. caruifolia Roxb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 71).

Isolation of a new coumarin (I) from leaves and stems and its structure elucidation (*Pharmazie* 1990, *45*, 696; *Chem. Abstr.* 1991, *114*, 39216 x); another coumarin (II) from plant (*Z. Chem.* 1990, *30*, 375; *Chem. Abstr.* 1991, *114*, 81324 f).

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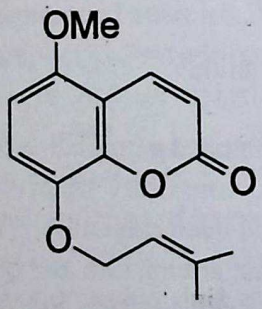
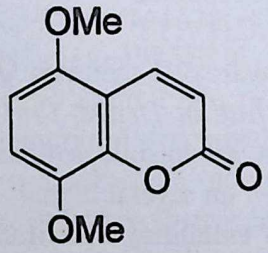


I



II

A. dracunculus L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 72).

Three new acetylenes - hepta-4,6-diyn-1,3-diol (I), hepta-4,6-diyn-1,3-diol-1-O-β-D-glucopyranoside (II) and its epimer (III); two phenylpropane derivatives - p-hydroxy-phenylethyl-O-β-D-glucopyranoside-6'-caffeate (IV) and eugenol-4-O-β-D-glucopyranoside (V); two monoterpenes - 9-hydroxygeraniol (VI) and 6,8-dihydroxy-7(9)-dehydro-6,7-dihydrogeraniol (VII) - along with (Z)hex-3-enol-1-O-β-D-glucopyranoside (VIII) and vomifoliol A-O-β-D-glucopyranoside (IX) isolated; in addition, nerolidol, elemicin, spathulenol, naringenin, eriodictyol and hesperetin isolated (*Planta Med.* 1991, *57*, 450).

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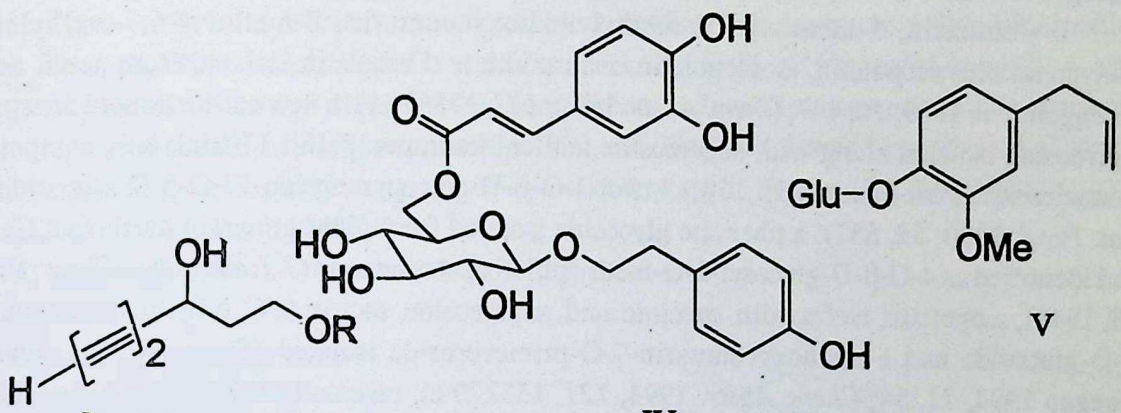
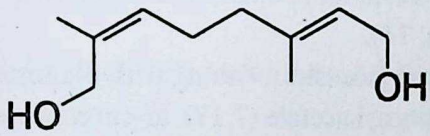


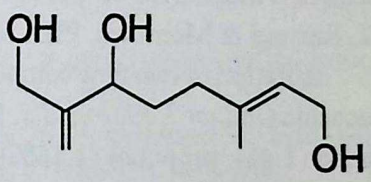
I
R = H
II
R = Glu
III
R = Allose

IV

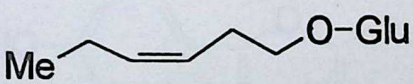
V



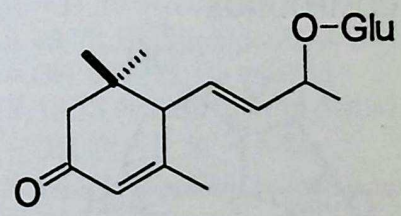
VI



VII



VIII



IX

A. edgeworthii Balak.; see *A. stricta* Edgew.

A. fragrans Willd.; see *A. maritima* L.

A. glauca Pall. ex Willd. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 72).

Oil showed antimicrobial and antifungal activities (*Rastit. Resur*. 1993, *29*, 70; *Chem. Abstr.* 1994, *121*, 263402 g).

Kaempferol, its 3-methyl ether, quercetin and its 3'-methyl, 3,7-dimethyl, 3,3'-dimethyl and 3,7,3'-trimethyl ethers, naringenin-7-methyl- and -4'-methyl ethers, eriodictyol-7-methyl-, -3'-methyl- and -7,3'-dimethyl ethers, daphnetin-7-methyl ether, scoparone and scopoletin isolated (*Fitoterapia* 1989, *60*, 460).

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A. gmelini Webb ex Stechm. syn. *A. sacrorum* Ledeb. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 69).

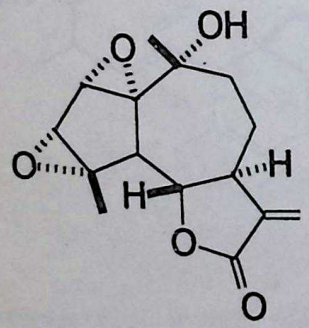
Coumarin, 5-methoxy-7,8-methylenedioxycoumarin, 8-methoxy-6,7-methylenedioxycoumarin, scopoletin, isoscopoletin, isofraxidin and esculetin isolated from aerial parts (*Zhongcaoyao* 1989, *20*, 487; *Chem. Abstr.* 1990, *112*, 175636 v); a new ent-kauranoid diterpene diglycoside isolated along with sugereoside and ent-kaurane-3β,16β,17-triol; new compound characterised as ent-kaurane-3β,16β,17-triol-3-O-β-D-glucopyranosido-17-O-β-D-glucoside (*J. Nat. Prod.* 1990, *53*, 657); a phenolic glycoside isolated from plant grown in north-east China and identified as 4-O-β-D-glucosyl-2-O-methylphloroacetophenone (*J. Heterocycl. Chem.* 1991, *28*, 1949); scopoletin, isofraxidin, succinic acid, sugereoside, sacroside C, o-hydroxycinnamoyl-β-D-glucoside and 6-methoxycoumarin-7-O-primeveroside isolated (*Shenyang Yaoxueyuan Xuebao* 1994, *11*, 54; *Chem. Abstr.* 1994, *121*, 153270 e); essentail oil from Himalayan plant contained artemisia ketone (28.0) and 1,8-cineole (13.0%) (*J. Essent. Oil Res.* 1994, *6*, 345; *Chem. Abstr.* 1994, *121*, 16366 z).

A. grata Wall.; see *A. roxburghiana* Besser var. *roxburghiana*

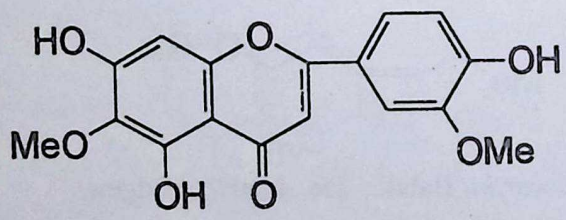
A. japonica Thunb. syn. *A. parviflora* Buch.-Ham. ex D.Don (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 74).

Isolation of two new compounds - artecanin and jaceosidin - along with β-sitosterol and its glucoside (*Indian J. Pharm. Sci.* 1989, *57*, 265); isobornyl acetate (7.17), ar-curcumene (4.72), limonene (1.48), propanol (1.16%) determined as major constituents of flowerhead oil by GC-MS (*J. Essent. Oil Res.* 1992, *4*, 527; *Chem. Abstr.* 1993, *118*, 120950 m).

NEW COMPOUNDS



Artecanin



Jaceosidin

Note : Author citation of *A. parviflora* given as Roxb. ex D.Don in Vol. 2 of the *Compendium* has been corrected here.

A. laciniata Willd. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 72).

Isolation of umbelliferone and scopoletin from aerial parts (*Indian J. Pharm. Sci.* 1989, *51*, 111); lacarol, quercetin, isorhamnetin, butein, isoliquiritigenin, 5-hydroxy-7,8-dimethoxycoumarin and 5,6-dimethoxy-7-(2',3'-dihydroxy-3'-methyl)butoxycoumarin isolated

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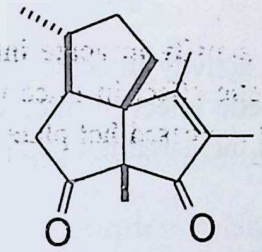
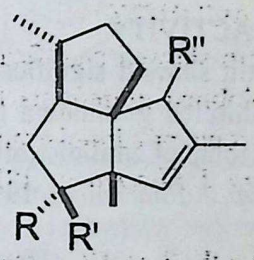
from aerial parts (*Khim. Prir. Soedin.* 1990, 115; *Chem. Abstr.* 1990, *113*, 37715 q); a major component - (3S,4S,7R,9R)silphiperfol-5-en-3-ol - along with its isomer (3S,4S,7S,9R) silphiperfol-5-en-3-ol and their corresponding ketones as minor components as well as silphiperfol-5-ene, (3S,4S,7R,9R)silphiperfol-5-en-3-ol, (3S,4S,7S,9R)silphiperfol-5-en-3-ol and (5S,9R)silphiperfol-6-en-3,5-dione as trace components isolated from essential oil; structure of new compounds determined (*Phytochemistry* 1991, *30*, 3349); analysis of essential oil of plants from Kashmir region indicate existence of two chemotypes (*J. Essent. Oil Res.* 1992, *4*, 107; *Chem. Abstr.* 1993, *118*, 219430 d).

NEW COMPOUNDS



(5S,9R)Silphiperfol-6-en-3,5-dione



(3S,4S,7R,9R)Silphiperfol-5-en-3-ol
R = H, R' = OH, R'' = α-Me
(3S,4S,7S,9R)Silphiperfol-5-en-3-ol
R = H, R' = OH, R'' = β-Me
Silphiperfol-5-ene
R,R' = H, R'' = α-/β-Me
(3R,4S,7R,9R)Silphiperfol-5-en-3-ol
R = OH, R' = H, R'' = α-Me
(3R,4S,7S,9R)Silphiperfol-5-en-3-ol
R = OH, R' = H, R'' = β-Me

A. maritima L. syn. *A. fragrans* Willd., *A. spicigera* C. Koch., *Seriphidium brevifolium* (Wall.) Y. Ling & Y.R. Ling (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 73).

Isolation of a new sesquiterpene oxylactone - alchanene - from aerial parts and its structure elucidation (*Khim. Prir. Soedin.* 1990, 632; *Chem. Abstr.* 1991, *115*, 46029 n); 5,7,3'4'-tetrahydroxy-6,5'-dimethoxyflavanone isolated (*Rastit. Resur.* 1992, *28*, 91; *Chem. Abstr.* 1993, *118*, 56115 p); oil from leaves or inflorescence of immature plant collected in an inner valley of Kumaon contained α-thujone (77.0), β-thujone (60.2) and 1,8-cineole (3.3%), whereas that from mature plant consisted of α-thujone (60.2), β-thujone (5.5) and 1,8-cineole (1.5%) as determined by GC-MS (*J. Essent. Oil Res.* 1992, *4*, 25; *Chem. Abstr.* 1993, *118*, 260667z); essential oil from Himalayan plant contained α-thujone (63.2%) as major constituent (*J. Essent. Oil Res.* 1994, *6*, 345; *Chem. Abstr.* 1994, *121*, 163663 z).

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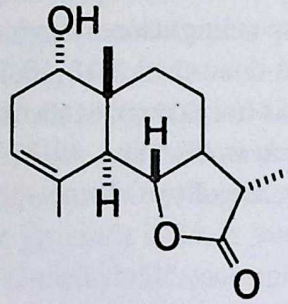


Alchanene

BIOLOGICAL ACTIVITY

Santonin showed significant anti-inflammatory activity in acute inflammation and significantly inhibited granuloma formation. Its antipyretic effect in mice was found to be independent of route of administration. Like morphine, it increased hot plate reaction time of treated mice (*Jap. J. Pharmacol.* 1994, *64*, 135).

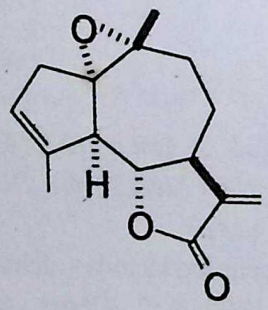
A. moorcroftiana Wall. ex DC.; see *A. wallichiana* Besser

A. myriantha Wall. ex Bess.

Stereochemistry of a cytotoxic guaianolide - arglabin - determined by 2D-NMR (*Fitoterapia* 1991, *62*, 275).

Distribution: Himachal Pradesh, Jammu & Kashmir.

NEW COMPOUNDS



Arglabin

A. nilagirica (Clarke) Pamp. syn. *A. vulgaris* auct. (non L.) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 74).

Isolation of (-)quebrachitol[(-)2-O-methylchiroinositol] and structure determination by NMR (*Indian J. Chem.* 1994, *33*B, 803).

A. pallens Wall.ex DC. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 75).

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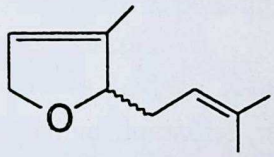
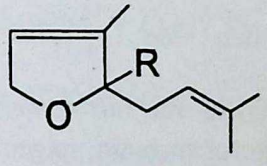
3,4-Epoxyisodavanone isolated from aerial parts and its structure elucidated; cirsimaritin also isolated (*Phytochemistry* 1990, *29*, 2702); five new furan derivatives - α- and β-dihydrorosefurans, hydroxydihydrorosefuran, its acetyl derivative and trans-hydroxydavanone - identified in essential oil; camphene, γ-cadinene, sabinene, p-cymene, linalool and its oxide, borneol, nerol, geraniol, davanol, farnesol, nor-davanone, cis- and trans-davanones, cis-hydroxydavanone, cis- and trans-davanafurans, artemone, davana acid and cinnamyl cinnamate also identified (*Phytochemistry* 1991, *30*, 549).

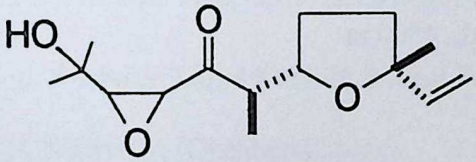
NEW COMPOUNDS



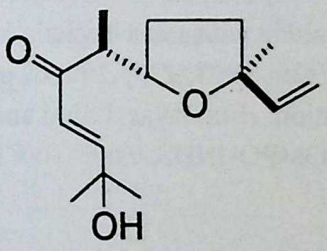
α-Dihydrorosefuran
~~ = α
β-Dihydrorosefuran
~~ = β



Acetoxydihydrorosefuran
R = OAc
Hydroxydihydrorosefuran
R = OH



3,4-Epoxyisodavanone



Trans-hydroxydavanone

A. parviflora Buch.-Ham. ex D.Don; see *A. japonica* Thunb.

A. persica Boiss. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 71).

Essential oil of plant from Ladakh contained artemisia ketone, yomogi alcohol, trans-sabinol, sabinene, cis- and trans-sabinen hydrate, α- and β-thujones and trans-sabinyl acetate (*J. Essent. Oil Res.* 1992, *4*, 1; *Chem. Abstr.* 1993, *118*, 240433 s).

A. roxburghiana Besser var. *grata* (Wall.) Hook.f.; see *A. roxburghiana* Besser var. *roxburghiana*

A. roxburghiana Besser var. *hypoleuca*; see *A. roxburghiana* Besser var. *roxburghiana*

A. roxburghiana Besser var. *roxburghiana* syn. *A. grata* Wall., *A. roxburghiana* Besser var. *grata* (Wall.) Hook.f., *A. roxburghiana* Besser var. *hypoleuca* (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 72).

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N-Phenyl-2-naphthalenamine, friedelan-3-one, α-amyrin and its acetate, β-amyrin acetate, penduletwin, jaceosidin, eupatilin, quercetin-3,3',4'-trimethyl ether, octacosanol, β-sitosterol, daucosterol, dotriacontanoic acid, octacosanoic acid and triacontanoic acid isolated from aerial parts (*Indian J. Chem.* 1994, *33*B, 302); essential oil from Himalayan plant contained β-thujone (65.3%) as major constituent (*J. Essent. Oil Res.* 1994, *6*, 345; *Chem. Abstr.* 1994, *121*, 163663 z); α- and β-amyrins and their acetates, octacosanol, octacosanoic, triacontanoic and dotriacontanoic acids, daucosterol and β-sitosterol isolated (*Zhongguo Zhongyao Zazhi* 1994, *19*, 164; *Chem. Abstr.* 1994, *121*, 5197 w).

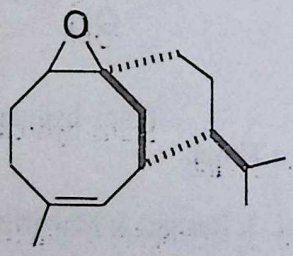
A. sacrorum Ledeb.; see *A. gmelini* Webb ex Stechm.

A. salsoloides Willd. var. *salsoloides*

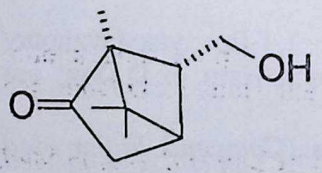
Isolation of apigenin, apigenin-7,4'-dimethyl ether, genkwanin and 5,7,3',5'-tetrahydroxy-6,4'-dimethoxyflavone from aerial parts (*Indian J. Pharm. Sci.* 1989, *51*, 111); a sesquiterpene epoxide - salsolene oxide - isolated from essential oil and its structure and stereochemistry determined (*Ann. Chem.* 1991, 1353); two new monoterpenes isolated from essential oil and characterised as 4-oxogeranyl acetate and 2,2,9-trimethyl-1,6-dioxaspira[4.4]nona-3,8-diene (*Ann. Chem.* 1992, 279); a new ketoalcohol - photooxonerol - isolated from absolute of plant from Ladakh along with some degradation products of davanone (*Flavour Fragrance J.* 1992, *7*, 299; *Chem. Abstr.* 1993, *119*, 102967 p).

Distribution: Himalayas, Lahul and Kumaon, alt. 4500 m.

NEW COMPOUNDS



Salsolene oxide



Photooxonerol

A. scoparia Waldst. & Kit. syn. *A. capillaris* Thunb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 75).

Artemetin, casticin, spathulenol, scoparone and capillarin identified in aerial parts (*Fitoterapia* 1990, *61*, 377).

BIOLOGICAL ACTIVITY

Scoparone exhibited dose-dependent vasorelaxant and immunosuppressive effects; at 1.0 to 30.0 μM, it relaxed rat thoracic aortic rings precontracted with phenylephrine and at 1.0 to 300 μM, it suppressed responses of human mononuclear cells to phytohaemagglutinin and mixed lymphocyte reaction. Thus, it can be used as immunosuppressive and vasorelaxant and also against transplant rejection and autoimmune diseases (*Eur. J. Pharmacol.* 1991, *198*, 211); scoparone (1.25, 2.5, 5.0 mg/kg, i.v.) depressed cardio-haemodynamic functions in anaesthetised

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cats, LVP-dp/dt loops and blood pressure were decreased and contractile and relaxant functions of left ventricle were inhibited. Results suggested that scoparone suppresses myocardial activity (*Zhongguo Yaoli Xuebao* 1993, *14*, 253; *Chem. Abstr.* 1993, *119*, 40594 d).

A. spicigera C. Koch.; see *A. maritima* L.

A. stricta Edgew. syn. *A. edgeworthii* Balak.

Oil from flowerheads contained ar-curcumene (8.21), terpinen-4-ol (7.03), camphor (4.92), cumin alcohol (4.80), cuminaldehyde (4.05), isocaryophyllene (1.30), linalool (1.03) and 3-isopropylphenol (1.03%) as determined by GC-MS (*J. Essent. Oil Res.* 1992, *4*, 527; *Chem. Abstr.* 1993, *118*, 120950 m).

Distribution: Himalayas, Ladakh, Kumaon and Sikkim, alt. 3000-4500 m.

A. tournefortiana Reichb.; see *A. biennis* Willd.

A. vulgaris L.; see *A. nilagirica* (Clarke) Pamp.

A. wallichiana Besser syn. *A. moorcroftiana* Wall. ex DC.

α-Thujone (12.8), artemisia ketone (10.2), β-pinene (7.7), 1,8-cineole (5.9), camphor (5.0), β-thujone (4.0), (E)nerolidol (2.6), vulgarone D (2.6) and α-longipinen-7β-ol (1.4%) determined in essential oil of aerial parts (*Flavour Fragrance J.* 1992, *7*, 73; *Chem. Abstr.* 1992, *117*, 76228 k).

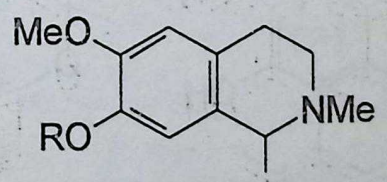
Distribution: Kashmir, Ladakh and Himachal Pradesh, alt. 2700-3900 m.

ARTHROCNEMUM (Chenopodiaceae)

A. glaucum Ung. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p.77).

Isolation of two new isoquinoline alkaloids - carnegine and (-)1-methylcorypalline - from aerial parts and their structure elucidation by X-ray analysis (*Phytochemistry* 1992, *31*, 1023).

NEW COMPOUNDS



Carnegine
R = Me
(-)Methylcorypalline
R = H

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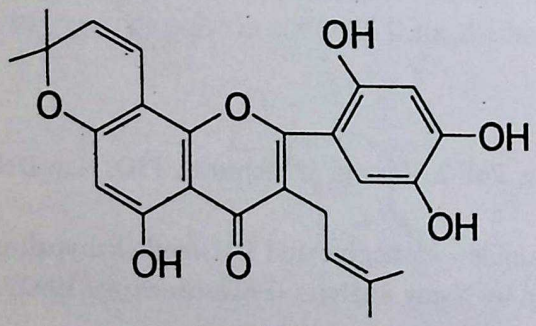
ARTOCARPUS (Moraceae)

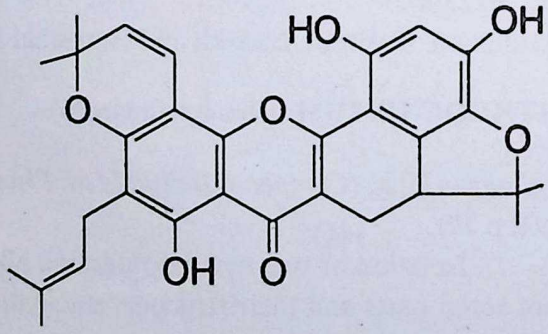
A. communis J.R. & G. Forst. syn. *A. incisus* (Thunb.) L.f. (*incisa*) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 78).

A selective 5-lipoxygenase inhibitor, 2-geranyl-3,4,2',4'-tetrahydroxydihydrochalcone, synthesised (Jpn. 2,11,537 (1990) Jan. 16; *Chem. Abstr.* 1990, *113*, 41083 b); Indonesian plant afforded three new prenylflavones - KB1, KB2 and KB3 - whose structures elucidated (*Chem. Pharm. Bull.* 1990, *38*, 1787); two new prenylflavones - artonins E and F - isolated from bark and their structures determined; cycloartobiloxanthone also isolated (*Heterocycles* 1990, *31*, 877); bark further yielded two new prenylflavones - cycloartomunin and dihydrocycloartomunin - and a new pyranodihydrobenzoxanthone - cycloartomunoxanthone - and their structures established (*Phytochemistry* 1991, *30*, 1669); a new pyrano-dihydrobenzoxanthone - artomunoxanthone - and a novel quinonoid pyranobenzoxanthone - artomunoxanthentrione - isolated from root bark and characterised; in addition, β-sitosterol, lupeol acetate and cudraflavone A isolated (*Phytochemistry* 1992, *31*, 364); Formosan plant afforded a new compound - artomunoxanthotrione epoxide - and its crystal structure determined by X-ray analysis (*Phytochemistry* 1992, *31*, 2563); root bark of Formosan plant further yielded three new bioactive compounds - cyclocommunol, cyclocommunin and dihydroisocycloartomunin and their structures elucidated (*Phytochemistry* 1992, *31*, 2922).

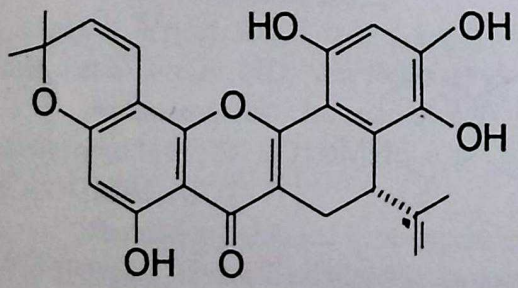
NEW COMPOUNDS



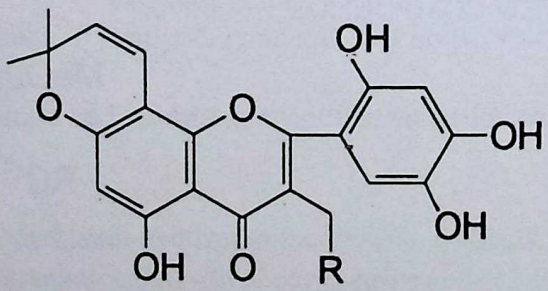
Artonin E



Artonin F



KB1



KB2
R = $CH_2C(Me_2)OH$
KB3
R = $CH{=}CMe_2$

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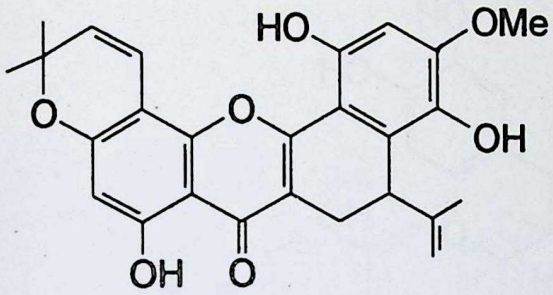
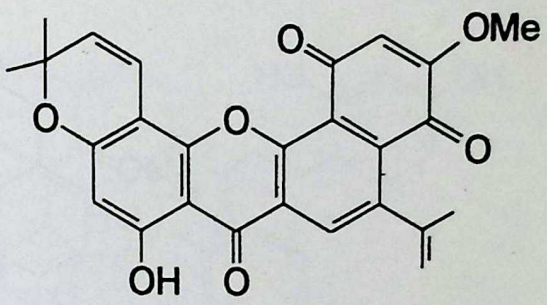
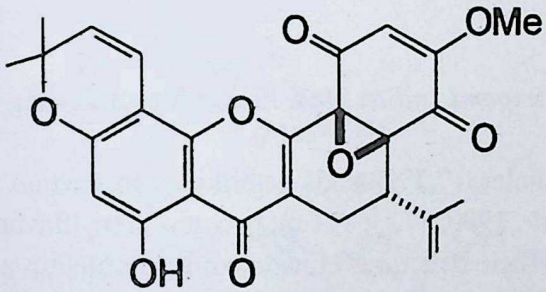


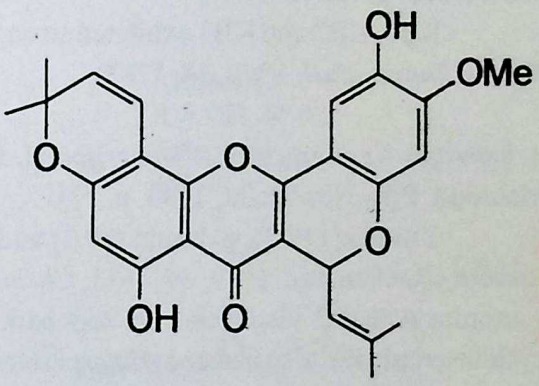
Artomunoxanthone



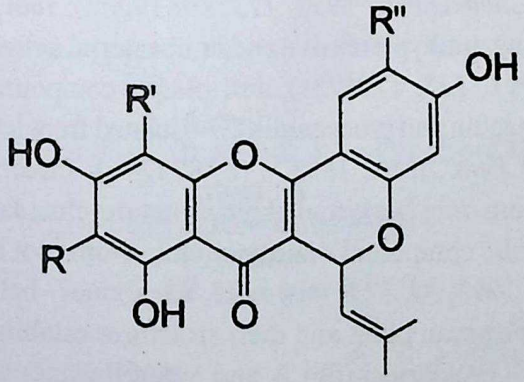
Artomunoxanthentrione



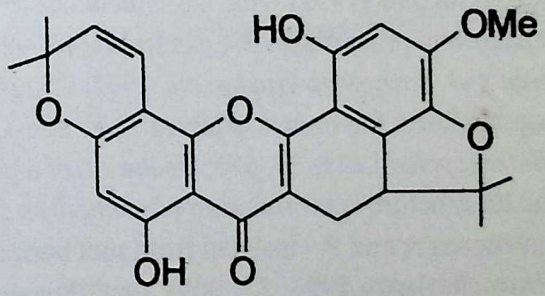
Artomunoxanthotrione epoxide



Cycloartomunin



Cyclocommunol
R,R',R'' = H
Cyclocommunin
R = $CH_2CH{=}CMe_2$, R',R'' = H
Dihydroisocycloartomunin
R = H, R' = $CH_2CH{=}CMe_2$, R'' = OMe



Cycloartomunoxanthone

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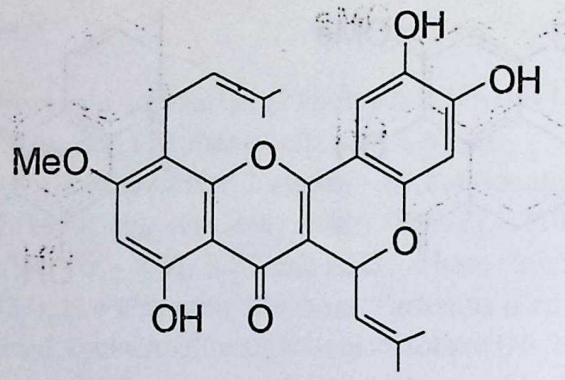

Dihydrocycloartomunin

BIOLOGICAL ACTIVITY

KB1, KB2 and KB3 exhibited strong cytotoxic activity against L-1210 in tissue culture (*Chem. Pharm. Bull.* 1990, *38*, 1787).

A. heterophyllus Lam. syn. *A. integrifolia* L.f. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 72).

Linoleic (40.2), palmitic (30.2) and ricinoleic (7.2%) acids determined in seed oil (*J. Am. Oil Chemists Soc.* 1989, *66*, 1631; *Chem. Abstr.* 1990, *112*, 6411 n); two new prenylflavones - artonins A and B - isolated from root bark and their structures elucidated; heterophyllin and cycloheterophyllin also isolated (*Heterocycles* 1989, *29*, 1447); root bark afforded two new Diels-Alder-type adducts - artonins C and D - whose structures determined (*J. Nat. Prod.* 1990, *53*, 391); glucose, galactose, mannose, mannitol, glucuronic and succinic acids isolated from aqueous extract (*J. Bangladesh Acad. Sci.* 1990, *14*, 49; *Chem. Abstr.* 1990, *113*, 208390 m); root and bark yielded two flavone derivatives (I and II) having antihypertensive and antibacterial activities (Jpn. 3,68,580 (1991) Mar. 25; *Chem. Abstr.* 1991, *115*, 179675s); anti-plaque compounds - (+)catechin, procyanidin B3, afzelechin(4α→8)-catechin and procyanidin C1- isolated from leaves (*Han'guk Saenghwa Hakhoechi* 1992, *25*, 347; *Chem. Abstr.* 1993, *118*, 87474 j); three new isoprenylated flavones - artonins J, K and L- from root bark and their structure elucidation (*Heterocycles* 1993, *36*, 575); isolation of a phenolic compound - heterophylol - from root bark and its structure determination (*Tetrahedron Lett.* 1993, *34*, 8249); two new flavanones - hetero-flavanones A and B - isolated from root bark of Formosan plant and their structures established (*Phytochemistry* 1993, *33*, 909); new flavonoids - cycloartocarpin A and heteroflavanone C - and a new fatty ester - 9-hydroxytridecyl docosanoate - isolated from root bark and characterised; in addition, β-sitosterol, betulin, betulinic and ursolic acids isolated (*Phytochemistry* 1994, *35*, 781); two new tetracyclic triterpenoid enantiomers (III and IV) isolated from dried latex and characterised as 24(R)- and 24(S)9,19-cyclolanost-3-one-24,25-diols; cycloartenone and cycloartenol also isolated (*Phytochemistry* 1994, *35*, 1001); 9,19-cyclolanost-23-en-3β,25-diol and 9,19-cyclolanost-25-en-3β,24-diol isolated from fruits (*Planta Med.* 1994, *60*, 196).

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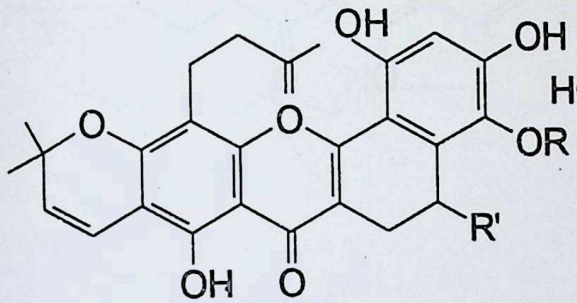
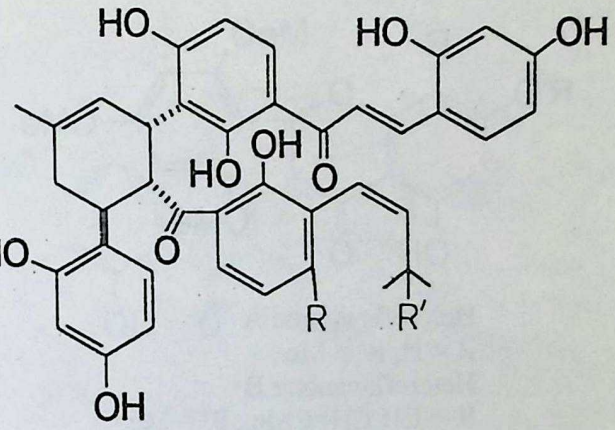
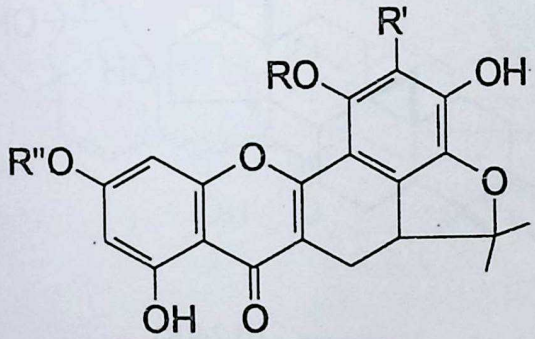
NEW COMPOUNDS



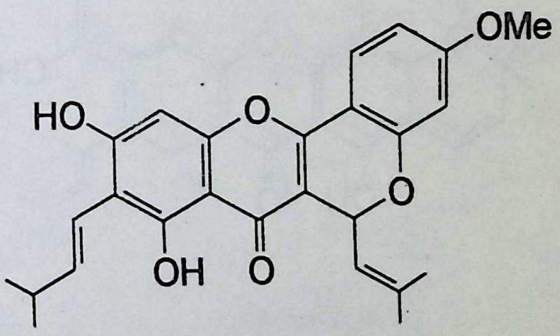
Artonin A
RR' = -CMe_2-
Artonin B
R = H, R' = C(Me)=CH_2



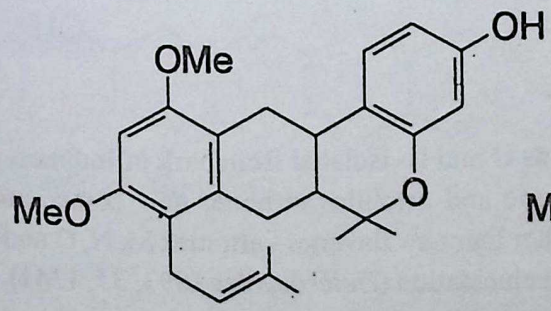
Artonin C
R = OH, R' = H
Artonin D
RR' = O



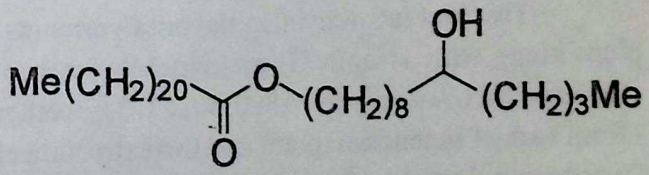
Artonin J
R,R'' = H, R' = $CH_2CH=CH_2$
Artonin K
R,R' = H, R'' = Me
Artonin L
R,R'' = Me, R' = H



Cycloartocarpin A



Heterophylol



9-Hydroxytridecyldocosanoate

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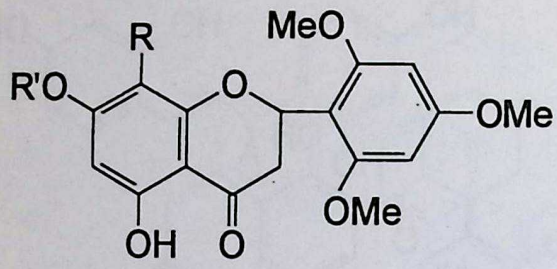
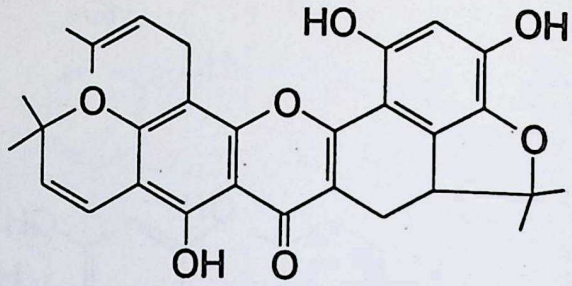
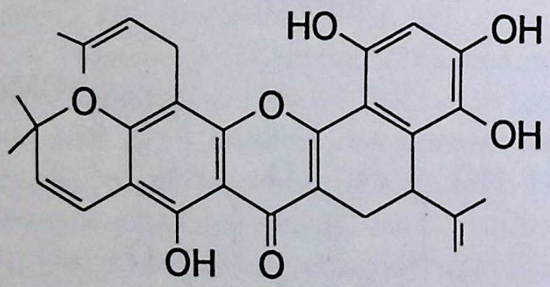


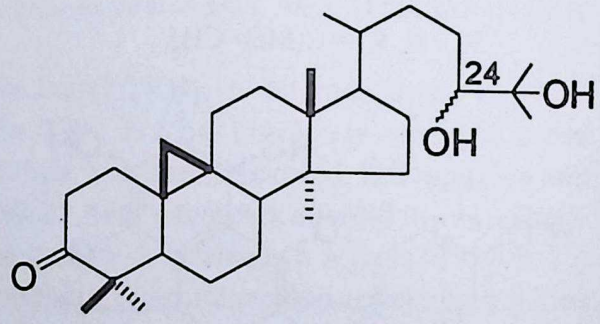
Heteroflavanone A
R = H, R' = Me
Heteroflavanone B
R = $CH_2CH{=}CMe_2$, R' = Me
Heteroflavanone C
R = $CH_2CH{=}CMe_2$, R' = H



I



II



III 24(R)
IV 24(S)

BIOLOGICAL ACTIVITY

Procyanidin C1 strongly inhibited glucosyl transferase from *Streptococcus mutans* (*Han'guk Saenghwa Hakhoechi* 1992, *25*, 347; *Chem. Abstr.* 1993, *118*, 87474 j).

A. incisus (Thunb.) L.f. (*incisa*); see *A. communis* J.R. & G. Forst.

A. integrifolia L.f.; see *A. heterophyllus* Lam.

A. rigidus Blume ssp. *rigidus* (*rigida*)

Two new isoprenylated flavones - artonins G and H- isolated from bark of Indonesian plant along with artonin E, cycloartobiloxanthone and artobiloxanthone; new compounds characterised (*Heterocycles* 1990, *31*, 2173); another four new flavones - artonins M, N, O and P - from bark of Indonesian plant and their structure elucidation (*Heterocycles* 1993, *35*, 1341). Distribution: Introduced into India in gardens.

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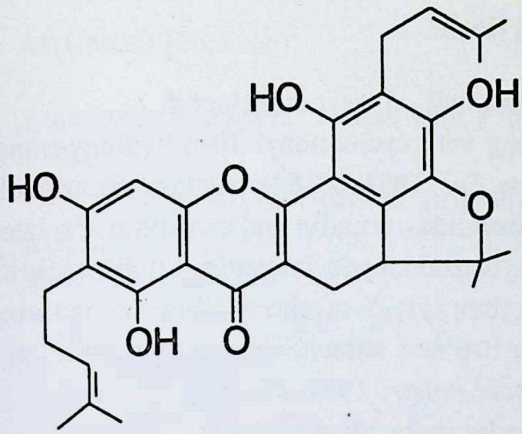
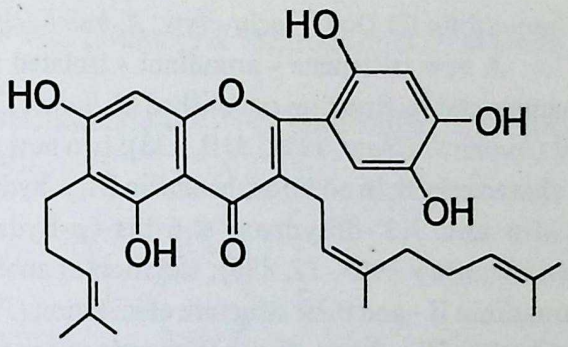
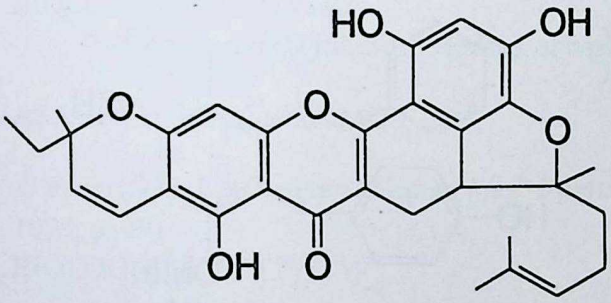
NEW COMPOUNDS



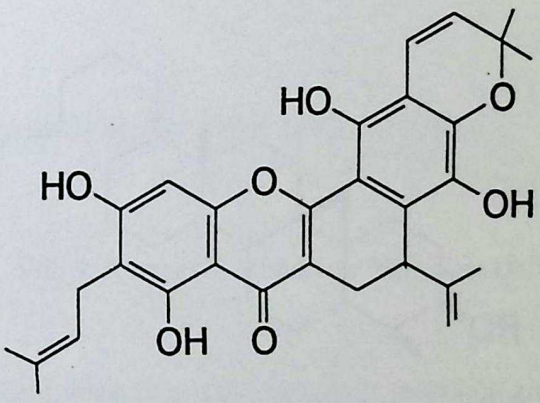
Artonin G



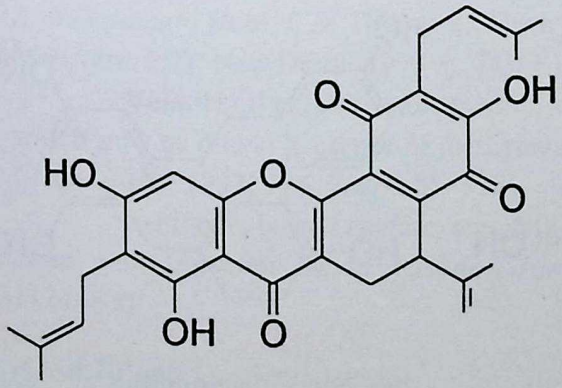
Artonin H



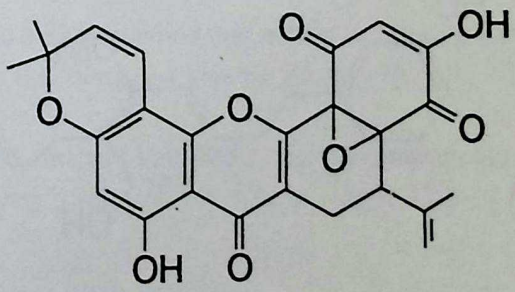
Artonin M



Artonin N



Artonin O



Artonin P

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ARUNDINA (Orchidaceae)

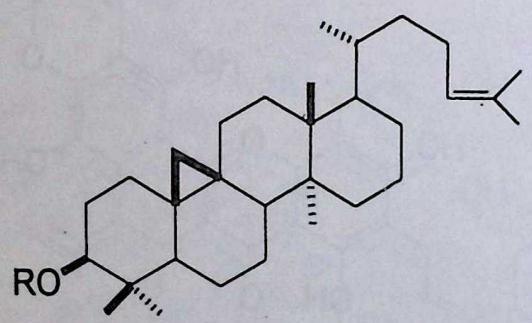
A. bambusifolia Lindl.; see *A. graminifolia* (D.Don) Hochr.

A. graminifolia (D.Don) Hochr. syn. *A. bambusifolia* Lindl., *A. revoluta* Hook.f.

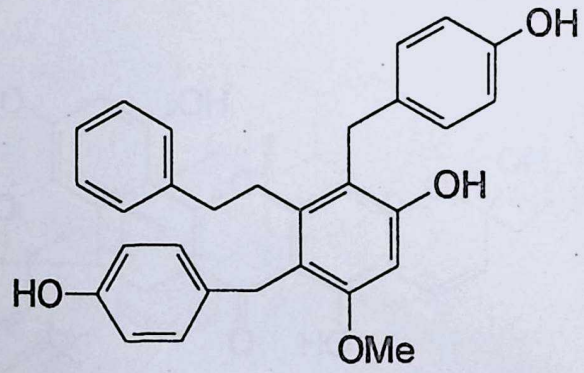
A new triterpene - arundinol - isolated along with cycloartenyl 3β-p-hydroxy-trans-cinnamate and its structure established (*J. Indian Chem. Soc.* 1991, *68*, 88); batatasin from whole plant (*Indian J. Chem.* 1992, *31*B, 133); two new stilbenoids - arundin and arundinin - isolated and characterised; in addition, batatasin III, p-hydroxybenzaldehyde, lusianthridin, flavanthrin, flavidin and 3,3'-dihydroxy-2,6-bis-(p-hydroxybenzyl)-5-methoxybibenzyl isolated (*Phytochemistry* 1993, *32*, 439); isolation of another two new stilbenoids - isoarundinin I and isoarundinin II - and their structure elucidation (*Phytochemistry* 1994, *35*, 205).

Distribution: Himalayas, Nepal eastwards and peninsular India, alt. 400-900 m.

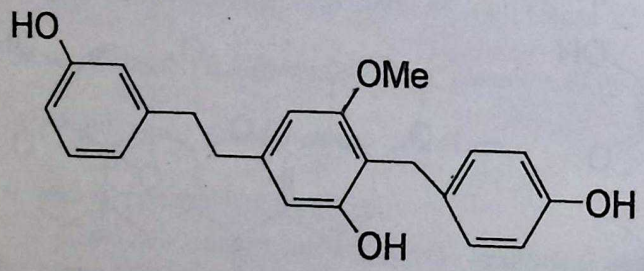
NEW COMPOUNDS



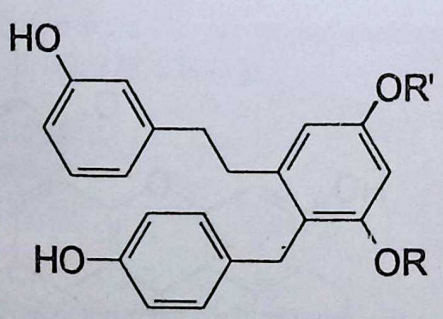
Arundinol
R = p-Coumaroyl



Arundin



Arundinin



Isoarundin I
R = Me, R' = H
Isoarundin II
R = H, R' = Me

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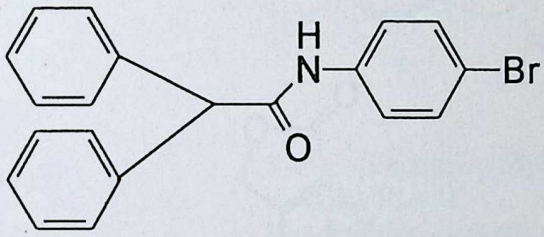
A. revoluta Hook.f.; see *A. graminifolia* (D.Don) Hochr.

ARUNDO (Poaceae)

A. donax L. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 79).

Isolation and crystal structure determination of N-(4'-bromophenyl)2,2-diphenyl-acetanilide (I) (*J. Nat. Prod.* 1993, *56*, 1590).

NEW COMOUNDS



I

BIOLOGICAL ACTIVITY

Compound (I) inhibited feeding of boll weevils (*J. Nat. Prod.* 1993, *56*, 1590).

ASARAM (Aristolochiaceae)

A. europaeum L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 79).

BIOLOGICAL ACTIVITY

Prolonged exposure to micromolar concentration of α-asarone causes morphological and ultrastructural alterations, triacylglycerol accumulation (fatty liver) and inhibition of protein synthesis and secretion in adult rats. The results suggest that this culture system could be a suitable *in vitro* model for studying long-term effects of hepatotoxic agents (*Planta Med.* 1993, *59*, 115).

A. himalaicum Hook.f. & Thoms. ex Duck (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 74).

Volatile oil exhibited antipyretic, analgesic and anticonvulsant action in mice and rats which may be due to presence of methyleugenol in it (*Zhongguo Yaoxue Zazhi* 1991, *26*, 470; *Chem. Abstr.* 1992, *116*, 76269 d).

α-Pinene, bornyl acetate, elemicin and isoelemicin identified as major components in aerial parts (*Lanzhou Daxue Xuebao Ziran Kexueban* 1989, *25*, 59; *Chem. Abstr.* 1990, *113*, 112468 s).

ASCLEPIAS (Asclepiadaceae)

A. curassavica L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 79).

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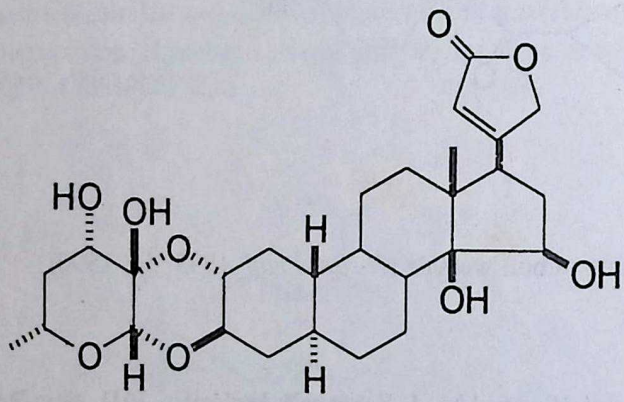
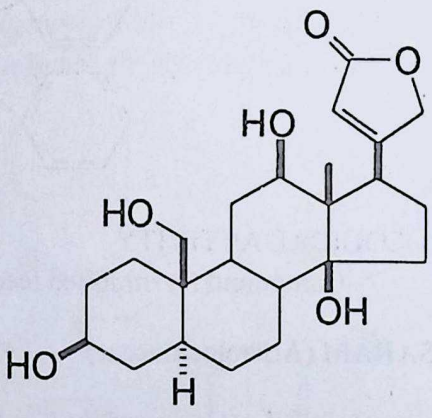
Two new compounds - 3'-epi-19-norafroside and 12β-hydroxycoroglaucigenin - isolated from stem and characterised (*Chem. Pharm. Bull.* 1991, *39*, 2709); ten new cardenolides isolated from seeds and characterised as 4'-O-β-cellobiosylgofruside, 4'-O-β-cellobiosylfrugoside, 12β-hydroxyfrugoside, 4'-O-β-D-glucosyl-12β-hydroxyfrugoside, 4'-O-β-cellobiosyl-12β-hydroxyfrugoside, 3'-O-β-D-glucopyranosylcalotropin, 16α-hydroxycalotropagenin, 16α-hydroxycalotropin, 3'-O-β-D-glucopyranosyl-16α-hydroxycalotropin and 3'-O-β-gentiobiosyl-16α-hydroxycalotropin; in addition glucosylgofruside, frugoside, glucosylfrugo-side and 12β-hydroxycoroglaucigenin isolated (*Chem. Pharm. Bull.* 1992, *40*, 2917).

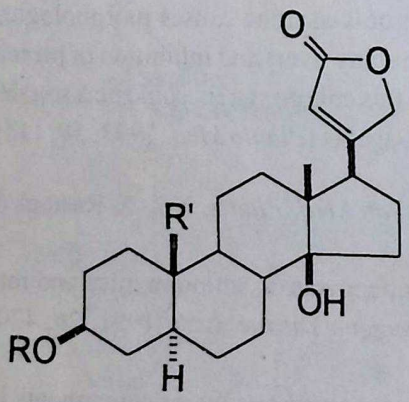
NEW COMPOUNDS



3'-Epi-19-norafroside

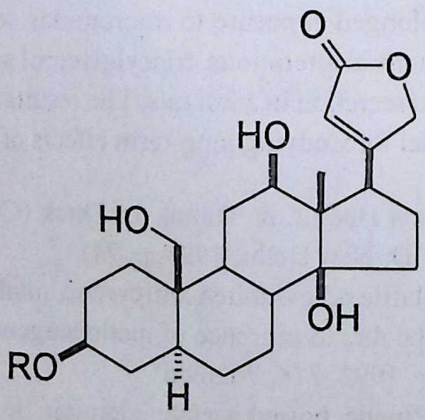


12β-Hydroxycoroglaucigenin



4'-O-β-Cellobiosylgofruside
R = Allomethylose(4→1)Glu,
R' = CHO

4'-O-β-Cellobiosylfrugoside
R = Allomethylose(4→1)Glu(4→1)Glu,
R' = CH_2OH



12β-Hydoxyfrugoside
R = Allomethylose

4'-O-β-Glucopyranosyl-12β-hydroxyfrugoside
R = Allomethylose(4→1)Glu

4'-O-β-Cellobiosyl-12β-hydroxyfrugoside
R = Allomethylose(4→1)Glu(4→1)Glu

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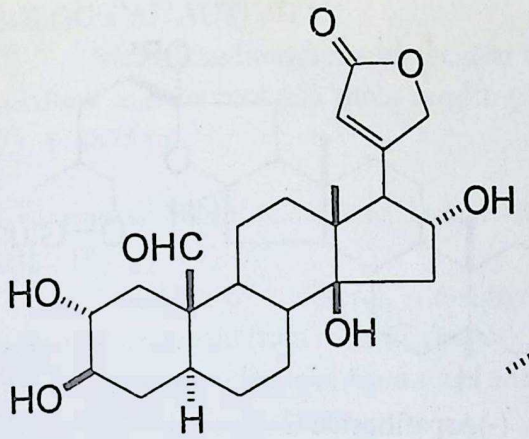
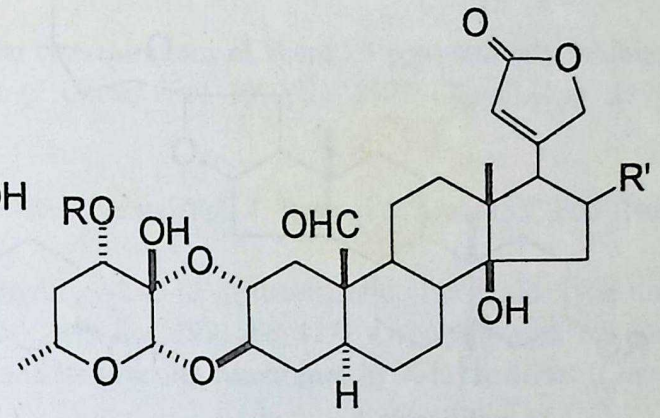


16α-Hydroxycalotropagenin



3'-O-β-Glucopyranosylcalotropin
R = Glu, R' = H
16α-Hydroxycalotropin
R = H, R' = α-OH
3'-O-β-Glucopyranosyl-16α-hydroxycalotropin
R = Glu, R' = α-OH
3'-O-β-Gentiobiosyl-16α-hydroxycalotropin
R = Glu(6→1)Glu, R' = α-OH

ASPARAGUS (Liliaceae)

A. adscendens Roxb. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 74).

Isolation of two new glycosides from roots and their characterisation as 3β-O-β-D-(2'-O-tetracosyl)xylopyranosyl stigmasterol and 3β-O-β-D-glucopyranosyl(1→2)-α-L-arabinopyranosylstigmasterol (*Phytochemistry* 1990, *29*, 2957); acid hydrolysate of butanol-soluble of roots contains saponins of stigmasterol and sarsasapogenin (*J. Indian Chem. Soc.* 1992, *69*, 893).

A. filicinus Buch.-Ham. ex D.Don (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 28).

Plant used as folk medicine in China for treatment of bronchitis, pneumonitis and cough (*Yaoxue Xuebao* 1990, *25*, 509; *Chem. Abstr.* 1991, *114*, 20974 w).

Three new steroidal saponins - (-)aspafiliosides A, B and C - along with β-ecdysone isolated from roots of Chinese plant and their structures determined (*Yaoxue Xuebao* 1990, *25*, 509; *Chem. Abstr.* 1991, *114*, 20974 w); two new furostanosides - filicinosides A and B - from roots and their structure elucidation (*Phytochemistry* 1994, *36*, 469).

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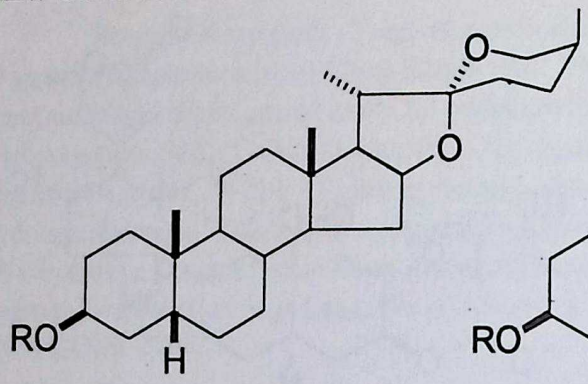
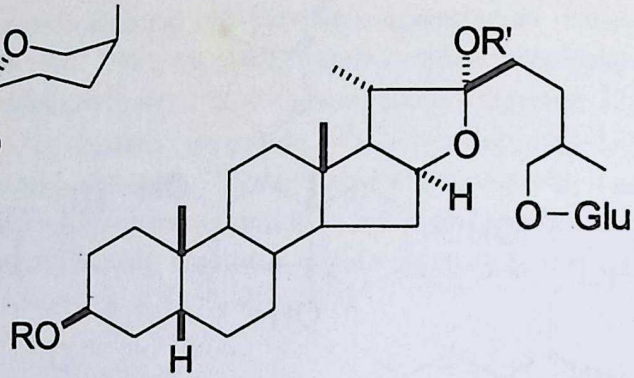
NEW COMPOUNDS



(-)Aspafilioside A
R = Glu(4→1)Xyl
(-)Aspafilioside B
R = Glu[(4→1)Xyl](6→1)Ara



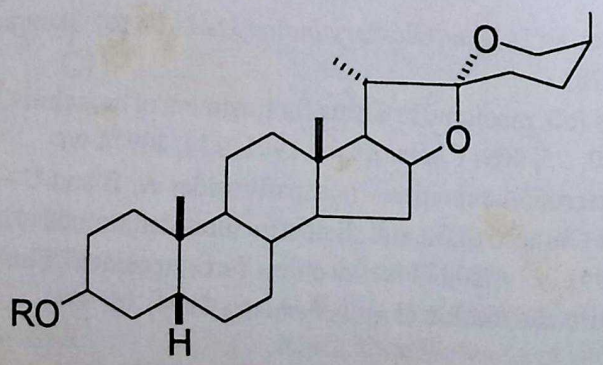
(-)Aspafilioside C
R = Glu[(4→1)Xyl)](6→1)Ara, R' = H
Filicinoside A
R = Glu, R' = Me
Filicinoside B
R = Glu, R'= H

A. officinalis L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 80).

Root extract is phytotoxic (*J. Chem. Ecol.* 1990, *16*, 1707; *Chem. Abstr.* 1990, *113*, 148875 m); crude saponin exhibited antifungal activity against *Candida, Cryptococcus, Trichophyton, Microsporum* and *Epidermophyton* (*Agric. Biol. Chem.* 1990, *54*, 2553).

Ferulic, isoferulic, malic, citric, fumaric and caffeic acids, along with methylenedioxycinnamic acid, isolated from active fraction (*J. Chem. Ecol.* 1990, *16*, 1707; *Chem. Abstr.* 1990, *113*, 148875 m); a new saponin - AS1 - isolated from active fraction and characterised as 3-O-(β-D-glucopyranosyl(1→2)-[β-D-xylopyranosyl(1→4)]-β-D-glucopyranosyl-25(S)-5β-spirostan-3β-ol (*Agric. Biol. Chem.* 1990, *54*, 2553); a fructo-polysaccharide - asparagosin - composed of saccharides possessing 11 to 21 fructose residues linked by β-(1→2) bonds and a nonterminal glucose residue bound to fructose residues at positions C-1 and C-6 isolated from roots (*New Phytol.* 1993, *123*, 263; *Chem. Abstr.* 1993, *119*, 91210 h).

NEW COMPOUNDS



AS 1
R = Glu[(2→1)Glu](4→1)Xyl

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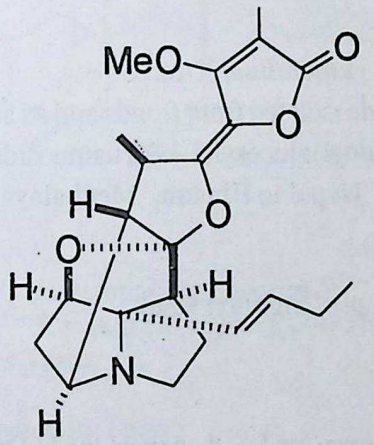
BIOLOGICAL ACTIVITY

Methylenedioxycinnamic acid at concentrations of about 25 ppm strongly inhibited *Lepidium sativum* root and shoot growth (*J. Chem. Ecol.* 1990, *16*, 1707; *Chem. Abstr.* 1990, *113*, 148875 m).

A. racemosus Willd. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 81).

Isolation of sitosterol, 4,6-dihydroxy-2-O-(2'-hydroxyisobutyl)benzaldehyde and undecanyl cetanoate from roots (*J. Indian Chem. Soc.* 1991, *68*, 427); a new polycyclic alkaloid - asparagamine A - isolated from roots and its structure determined by X-ray analysis (*Chem. Pharm. Bull.* 1994, *42*, 1360).

NEW COMPOUNDS



Asparagamine A

ASPHODELUS (Liliaceae)

A. fistulosus L. var. *tenuifolius* (Cav.) Baker; see *A. tenuifolius* Cav.

A. tenuifolius Cav. syn. *A. fistulosus* L. var. *tenuifolius* (Cav.) Baker (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 82).

Isolation of lacciac acid D, desoxyerythrolaccin, asphodelin, chrysophanol, aloe-emodin and β-furoic acid from aerial parts (*Acta Pharm. Jugosl.* 1991, *41*, 147; *Chem. Abstr.* 1991, *115*, 203342 d; *Sci. Pharm.* 1992, *60*, 279; *Chem. Abstr.* 1993, *119*, 188374 c).

ASPLENIUM (Aspleniaceae)

A. adiantum-nigrum L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 78).

Three new xanthones isolated from aerial parts and characterised as 1-hydroxy-3,6,7-trimethoxyxanthone-2,4-di-C-glucoside and two of its rhamnosides (*Phytochemistry* 1991, *30*, 3839).

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A. multijugam Wall. ex Mett.; see *A. normale* D.Don

A. normale D.Don syn. *A. multijugam* Wall. ex Mett.

Apigenin-7-O-dirhamnoside, luteolin-7-dirhamnoside, genkwanin-4'-O-glucosyl-rhamnoside, vicenin-2 and 6,8-di-C-glucosylluteolin isolated (*Phytochemistry* 1990, *29*, 3543); apigenin-7-O-methyl ether-4'-O-rutinoside and apigenin-4'-O-methyl ether 7-O-rutinoside isolated form Malaysian plant (*Pertanika* 1991, *14*, 149; *Chem. Abstr.* 1992, *117*, 66597 r); acacetin and genkwanin identified (*Pertanika* 1991, *14*, 297; *Chem. Abstr.* 1993, *18*, 120945 p); a new flavone glycoside isolated from fronds, characterised as apigenin-7-O-α-L-rhamnosido-4'-O-α-L-glucosylrhamnoside (*Phytochemistry* 1993, *32*, 1629).

Distribution: Himalayas, from Nepal to Bhutan, Meghalaya and hills of south India, alt. 900-2400 m.

A. prolongatum Hook. syn. *A. rutaefolium* Kuntze

A new flavonol glycoside isolated from fronds and its structure determined as kaempferol-3-O-rhamnosido-7-O-(6'-O-feruloyl)glucosyl(1→3)rhamnoside (*Phytochemistry* 1990, *29*, 2742).

Distribution : Himalayas, from Nepal to Bhutan, Meghalaya and Tirnnevelly in Tamil Nadu, alt. 600-1500 m.

A. rutaefolium Kunzte; see *A. prolongatum* Hook.

ASTER (Asteraceae)

A. ageratoides Turcz. syn. *A. amellus* L., *A. trinervius* D.Don (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 29).

Chinese plant reputed as antipyretic, expectorant and antitussive and used for treatment of fever, cold, tonsilitis, sore, bronchitis, snake bite and bee-sting (*Chinese Chem. Lett.* 1993, *4*, 39; *Chem. Abstr.* 1994, *120*, 265758 f).

A new diterpene glycoside (I) isolated from aerial parts and charactrised by 2D-NMR as 16β-hydroxy-17-acetoxy-(-)kauran-19-oic acid-β-D-glucopyranosyl ester (*Chinese Chem. Lett.* 1993, *4*, 39; *Chem. Abstr.* 1994, *120*, 265758 f; *Phytochemistry* 1993, *33*, 1181); 16β,17-dihydroxy-(-)kauran-19-oic acid-β-glucopyranosyl ester (II) also isolated (*Phytochemistry* 1993, *33*, 1181).

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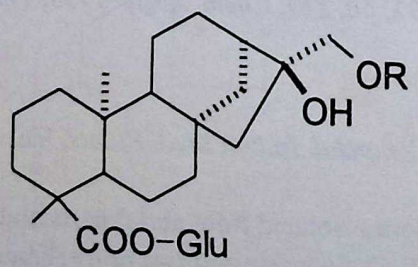

I
R = Ac
II
R = H

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A. altaicus Willd. syn. *Heteropappus altaicus* (Willd.) Novopkr. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 82).

Isorhamnetin-3-O-rutinoside, rutin and nicotiflorin isolated (*Planta Med.* 1993, *59*, 284); heteropappus saponin 5 isolated and its structure determined (*Pharmazie* 1994, *49*, 209; *Chem. Abstr.* 1994, *121*, 53908 a).

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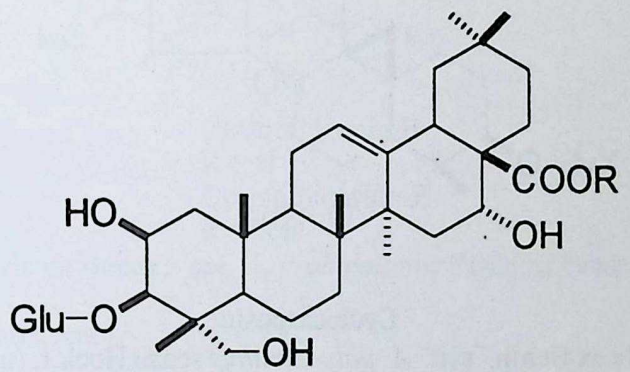

Heteropappus saponin 5
R = Ara (2→1)Rha[(3→1)Apiose](4→1)Xyl

A. amellus L.; see *A. ageratoides* Turcz.

A. trinervius D.Don; see *A. ageratoides* Turcz.

ASTEROPYRUM (Ranunculaceae)

A. peltatum (Franch.) Drumm. & Hutch.

Isolation of jatrorrhizine, columbamine, palmatine and magnoflorine (*Zhongguo Zhongyao Zazhi* 1990, *15*, 733; *Chem. Abstr.* 1991, *114*, 160756 b).

Distribution: Himalayas, Bhutan, alt. 2700 m.

ASTRAGALUS (Papilionaceae)

A. cicerifolius Royle ex Fischer; see *A. grahamianus* Royle ex Benth.

A. coluteocarpus Boiss. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 83).

A new triterpene glycoside - cyclocarposide - isolated from aerial parts and its structure determined (*Khim. Prir. Soedin.* 1990, 653; *Chem. Abstr.* 1991, *115*, 68393 d).

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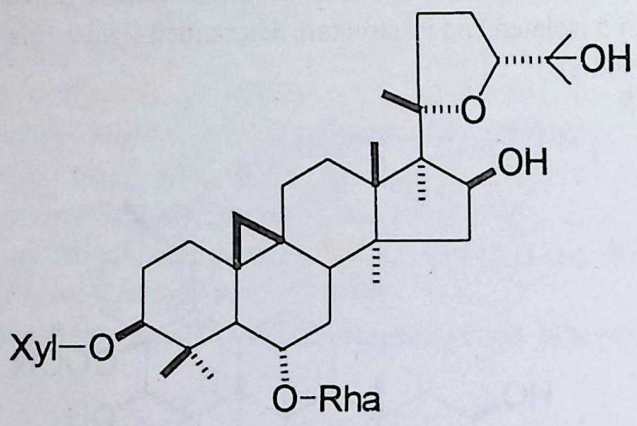


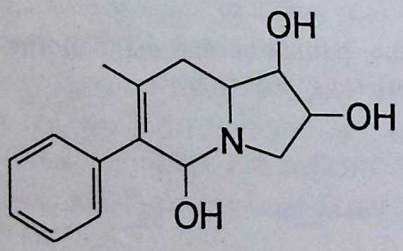
Cyclocarposide

A. grahamianus Royle ex Benth. syn. *A. polyacanthus* sensu Hook.f. (non Royle ex Benth.), *A. cicerifolius* Royle ex Fischer [sensu Hook.f. *Fl. Brit. India* 2:134, 1876, p.p.]

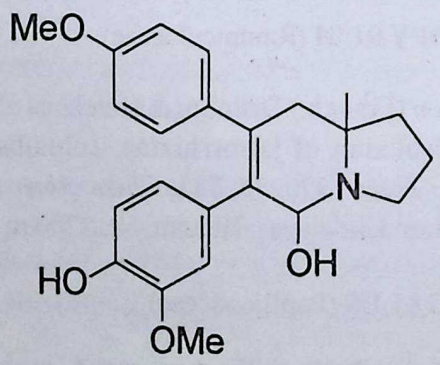
A new seco-phenanthroindolizine alkaloid - polycanthidine - isolated and its structure established (*Indian Drugs* 1993, *30*, 595); another new alkaloid - polycanthine - from aerial parts and its structure elucidation (*Indian Drugs* 1993, *30*, 651).

Distribution: Kashmir and Punjab.

NEW COMPOUNDS



Polycanthine



Polycanthidine

A. orbiculatus Ledeb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 84).

A. glycoside - cycloorbicoside B - isolated from aerial parts which on acid hydrolysis afforded a genin - cycloorbigenin B; structures of glycoside and genin elucidated (*Khim. Prir. Soedin.* 1989, 809; *Chem. Abstr.* 1990, *112*, 175681 f; *Khim. Prir. Soedin.* 1990, 699; *Chem. Abstr.* 1991, *115*, 46030 f).

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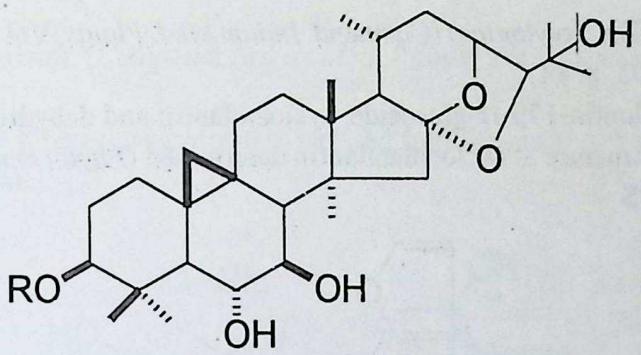


Cycloorbigenin B
R = H
Cycloorbicoside B
R = Xyl

A. polyacanthus Royle ex Benth.; see *A. grahamianus* Royle ex Benth.

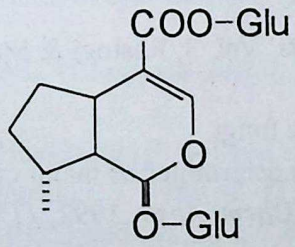
ASYSTASIA (Acanthaceae)

A. bella Benth. & Hook.f.

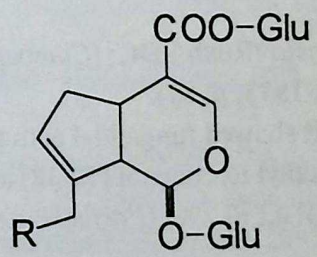
Five new iridoid glucosides - asystasiosides A, B, C, D and E - isolated and characterised; in addition, catalpol, gardoside methyl ester, 8-epiloganin and mussaenoside isolated (*Phytochemistry* 1989, *28*, 3361).

Distribution: Indigenous to South Africa, introduced into Indian gardens.

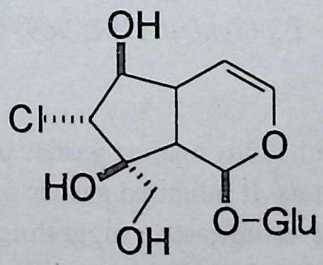
NEW COMPOUNDS



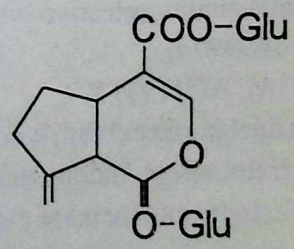
Asystasioside A



Asystasioside B
R = H
Asystasioside D
R = OH



Asystasioside E



Asystasioside C

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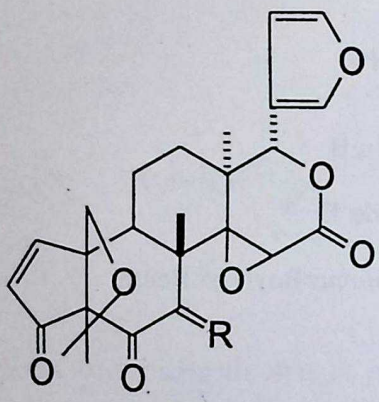
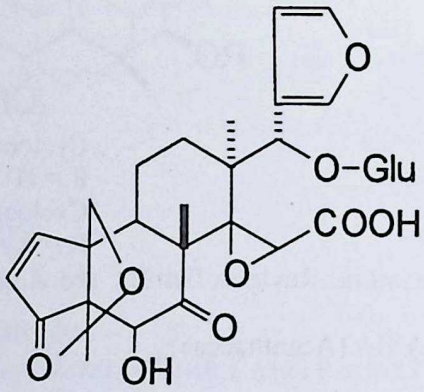
ATALANTIA (Rutaceae)

A. ceylanica (Arn.) Oliv. (*zeylanica*) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 84).

Isocycloatalantin-17β-D-glucoside, cycloatalantin and dehydrocycloatalantin isolated from seeds; crystal structure of cycloepiatalantin determined (*Phytochemistry* 1994, *36*, 163).

NEW COMPOUNDS





Cycloepiatalantin
R = α-OH,H
Cycloatalantin
R = β-OH,H
Dehydrocycloatalantin
R = O

Isocycloatalantin-17β-D-glucoside

A. missionis (Wt.) Oliver; see *Pamburus missionis* (Wt.) Swingle

A. monophylla (Roxb.) DC. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 81).

Oil showed fungicidal activity against saprophytic fungi.

Methyl isoeugenol (32.38) and sabinene (28.51%) determined as major constituents of leaf essential oil (0.2%) (*Parfuem. Kosmet.* 1992, *73*, 336; *Chem. Abstr.* 1992, *117*, 258030 x).

ATROPA (Solanaceae)

A. belladonna L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 85).

Total enantioselective synthesis of (-)calystegin B2 (*Synlett* 1992, 969; *Chem. Abstr.* 1993, *118*, 169390 t).

BIOLOGICAL ACTIVITY

Scopolamine exhibited dose-dependent antiulcer activity against gastric ulcer induced by cold-restraint stress, indomethacin and acetic acid in rats. It inhibited gastric acid secretion and pepsin activity and increase gastric barrier, mucus and serum gastrin suggesting its antiulcer effect (*Yaoxue Xuebao* 1990, *25*, 90; *Chem. Abstr.* 1990, *112*, 229543 h).

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ATYLOSIA (Papilionaceae)

A. scarabaeoides (L.) Benth. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 86).

A new flavone glucoside - atyloside - isolated from leaves and characterised (*Indian J. Chem.* 1990, *29*B, 1154).

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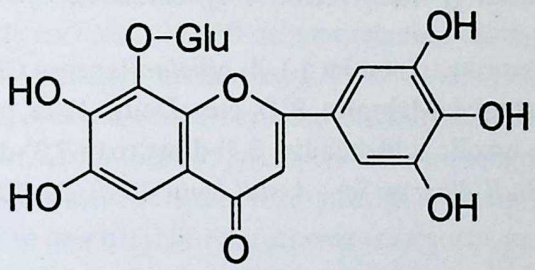

Atyloside

AVENA (Poaceae)

A. elatior L.; see *Arrhenatherum elatius* (L.) J. & C. Presl var. *elatius*

AVERRHOA (Oxalidaceae)

A. bilimbi L. (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 31).

Isolation of cyanidin-3-O-β-D-glucoside (0.01%) (*Fitoterapia* 1992, *63*, 89).

A. carambola L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 84).

(E)Hex-2-enal (0.24) and methyl benzoate (0.19%) determined by GC-MS in fruit pulp (*Flavour Fragrance J.* 1989, *4*, 177; *Chem. Abstr.* 1990, *112*, 196841 y); cyanidin-3-O-β-D-glucoside (0.01%) and cyanidin-3,5-di-O-β-D-glucoside isolated (*Fitoterapia* 1992, *63*, 89); a new ionone glucoside isolated from fruit juice and characterised as 4-(1',4'-dihydroxy-2',2',6'-trimethylcyclohexyl) but-3-en-2-O-β-glucoside (*Nat. Prod. Lett.* 1993, *3*, 95,; *Chem. Abstr.* 1994, *120*, 240102 z); isolation and structure elucidation of (1'S,4E)2,3-dihydroabscisic alcohol (*Phytochemistry* 1994, *36*, 811).

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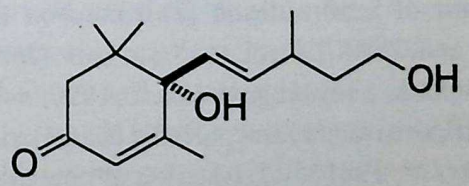

(1'S,4E)2,3-Dihydroabscisic alcohol

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AVICENNIA (Avicenniaceae)

A. marina (Forsk.) Vierh. syn. *A. officinalis* sensu Clarke, p.p. (non L.) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 86).

Verbascoside, isoverbascoside and derhamnosylverbascoside isolated from leaves (*Planta Med.* 1993, *59*, 387).

A. officinalis Clarke; see *A. marina* (Forsk.) Vierh., *A. officinalis* L.

A. officinalis L. syn. *A. tomentosa* auct. (non Jacq.), *A. officinalis* sensu Clarke, p.p. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 86):

Lupeol, betulinic acid, ursolic acid, betulin, 5,4'-dihydroxy-7,3'-dimethoxyflavone and 8-O-acetylharpagide isolated (*Bull. Pharm. Sci., Assiut Univ.* 1990, *13*, 59; *Chem. Abstr.* 1991, *114*, 182105 r).

A. tomentosa Jacq.; see *A. officinalis* L.

AZADIRACHTA (Meliaceae)

A. indica (L.) A.Juss. syn. *Melia azadirachta* L., *M. indica* Brandis (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 87).

Within 7 to 10 days of intake of neem oil hyperglycaemic patients reported relief in itching, dyspepsia, tiredness and muscular pain and wound healing started fast after therapy. These results suggest that the oil is effective in secondary diabetes. It was most suitable for mild and moderate diabetes and 50% effective in severe diabetes (*Indian Med. J.* 1990, *84*, 331); oil showed equal antifeedant activity towards first and third instar nymphs and adults of strawberry aphid, *Chaetosiphon fragaefolei*; 50% feeding deterrence being observed with concentration of 1.1% oil (*J. Chem. Ecol.* 1993, *19*, 1761; *Chem. Abstr.*1993, *119*, 221708 q).

Leaf extract at median doses of 1.17 g/kg and 930.0 mg/kg showed significant anti-inflammatory activity against 50-HT- and PGE1-induced oedema respectively, suggesting that effect is due to antagonism of deleterious effect of 5-HT and PGE1 on blood vessels (*Indian J. Pharmacol.* 1993, *25*, 99). Leaf extract by itself did not alter hepatic glycogen level in normal as well as streptozotocin-induced diabetic rats but in glucose-fed hyperglycaemic rats, insulin maintained normal level of hepatic glycogen whereas leaf extract substantially lowered it and this was further lowered when both exogenous insulin and extract were administered (*Indian J. Pharmacol.* 1993, *25*, 174).

Stereoselective synthesis of azadiradione (*Tetrahedron Lett.* 1989, *30*, 3023); polysaccharides - CSP-I, CSP-II and CSP-III - isolated from bark (Jpn. 1,275,602 (1989) Nov. 06; *Chem. Abstr.* 1990, *112*, 204662 h; *Shoyakugaku Zasshi* 1990, *44*, 29; *Chem. Abstr.* 1990, *113*, 178105 c); CSSP-I, -II and -III also isolated and partially characterised (*Shoyakugaku Zasshi* 1990, *44*, 29; *Chem. Abstr.* 1990, *113*, 178105 c); isolation of new diterpenes - nimbilicin and nimbocidin - from root bark and their structure elucidation (*Z. Naturforsch.* 1989, *44*B, 1279;

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Chem. Abstr. 1990, *112*, 52298 d); two new tetranortriterpenoids - limbocinin and limbocidin - along with two new glycosides of stigmasterol isolated from seeds and their structures elucidated (*Pakistan J. Sci. Ind. Res.* 1989, *32*, 435; *Chem. Abstr.* 1990, *112*, 73762 r); isolation of two new polyacetate derivatives - margosinone and margosinolone - from stem bark and their characterisation (*Fitoterapia* 1989, *60*, 519); chemical modification and structure-activity relationships of azadirachtin, azadirachtol and salannin (*Tetrahedron* 1989, *45*, 5175); isolation and structure elucidation of an antimalarial compound, gedunin (*J. Nat. Prod.* 1989, *52*, 922); root bark afforded two new terpenoids - nimbilin and nimolinin; their structures determined (*J. Nat. Prod.* 1989, *52*, 1209); a new limonoid - 28-deoxonimbolide - along with nimbolide isolated from Tanzanian plant and its structure established (*J. Nat. Prod.* 1989, *52*, 1246); three new tricyclic diterpenoids - nimbosodione, nimbisonol and demethylnimbionol - isolated from stem bark and characterised (*J. Nat. Prod.* 1990, *53*, 816); another two new diterpenoids - margosone and margosolone - isolated from stem bark and their structures determined (*Planta Med.* 1990, *56*, 84); root bark afforded three new tricyclic diterpenoids - margocin, margocinin and margocilin - whose structures established (*Phytochemistry* 1990, *29*, 911); cis- and trans- 3,5-diethyl-1,2,4-trithiolanes identified in seed volatiles; previously (*J. Agric. Food Chem.* 1988, *36*, 1048) these were misassigned as cis- and trans-n-propyl-1-propenyltrisulphides (*Phytochemistry* 1990, *29*, 3351); a new tetranortriterpene alcohol - 17-epinimbocinol - along with nimbocinol isolated from nimbidin fraction of oil and its structure determined (*Phytochemistry* 1990, *29*, 3963); a new trinortriterpenoid - limbonin - along with epoxyazadiradione and azadiradione isolated from kernel and characterised (*Proc. Pak. Acad. Sci.* 1990, *27*, 333; *Chem. Abstr.* 1992, *116*, 191035 m); two new tetranortriterpenoids - 6-deacetylnimbinal and 28-deoxonimbolide - from leaves and a new tetranortriterpenoid - nimbinol - from seeds isolated and characterised; partial NMR reassignments to nimbanal, 6-deacetylnimbin, nimbin and nimbolide (*Tetrahedron* 1990, *46*, 775); total synthesis of azadirachtin (*Tetrahedron* 1991, *47*, 6813); isolation of azadirachtin as principal insecticidal and antifeedant component from seeds, dipropyldisulphide as major volatile compoent and 1-cinnamoyl melianolone from fruits; fruits also afforded a new insecticidal component characterised as 1-cinnamoyl-3,11-dihydroxymeliacarpin (*ACS Symp. Ser.* 1991, 293; *Chem. Abstr.* 1991, *115*, 25960 u); isolation of a new tetracyclic triterpenoid - azadirol - from seedcoat and its structure elucidation; kulactone also isolated (*J. Nat. Prod.* 1991, *54*, 408); a new limonoid - mahmoodin - isolated from oil and its absolute configuration established; in addition, azadirone, epoxyazadirone, nimbin, gedunin, azadiradione, deacetylnimbin and 17-hydroxyazadiradione isolated; a new protolimonoid - naheedin - isolated from fruits along with azadirachtol and characterised; fruit coat contained eicosane, docosane, 2-methyltricosane and docosene as identified by GC-MS (*J. Nat. Prod.* 1992, *55*, 303); two new tetranortriterpenoids - azadirachtins H and I - from kernels and their structure determination (*J. Nat. Prod.* 1992, *55*, 596); another new tetranortriterpenoid - azadirachtin K - from seed kernels and its characterisation; in addition, nimbolide, ohchinolide B, 6-deacetylnimbin, azadiradione, nimbin and salannin isolated (*Indian J. Chem.* 1992, *31*B, 295); isolation of a new triterpene - azadirinin - from roots and its structure determination (*Fitoterapia* 1992, *63*, 118); a new compound isolated from seeds

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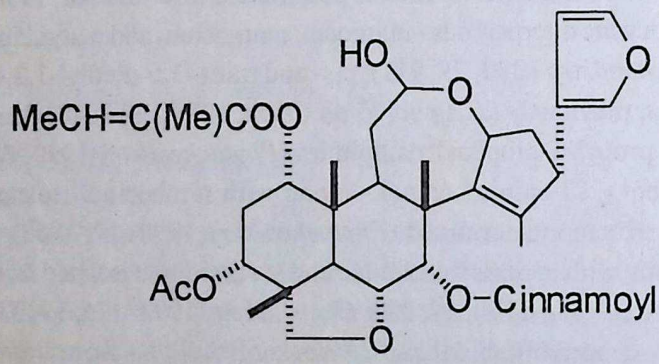
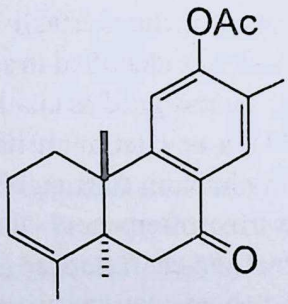
and characterised as l-tigloyl-3-acetyl-11-hydroxy-4β-methylmeliacarpin (*Phytochemistry* 1992, *32*, 213); three new degraded triterpenoids isolated from fresh uncrushed fruit coat and characterised as desfurano-azadiradione (7α-acetoxy-4,4,8-trimethyl-5α-(13α-Me)androsta-1,14-dien-3,16-dione), 7α-acetoxy-4,4,8-trimethyl-5α-(13α-Me)-17-oxo-androsta-1,14-dien-3,16-dione and 7α-acetoxy-4,4,8-trimethyl-5α-17-oxo-androsta-1,14-dien-3,16-dione (*Phytochemistry* 1992, *31*, 4275); structure of nimbinone confirmed by synthesis (*Synth. Commun.* 1992, *22*, 2571; *Chem. Abstr.* 1992, *117*, 234289 n); absolute configuration of azadirachtin determined by X-ray analysis (*Chem. Commun.* 1992, 1304); isolation of a new isoprenylated flavanone from young leaves and exudate of resin glands present in shoot apices and its characterisation as 8-prenyl-5,7-dihydroxy-3'-(3-hydroxy-3,3-dimethylbutyl)-4'-methoxyflavanone (*Phytochemistry* 1993, *34*, 1194).

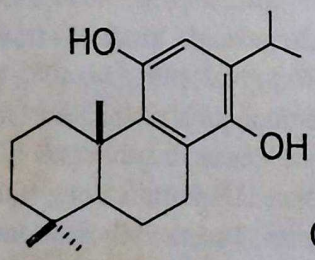
NEW COMPOUNDS



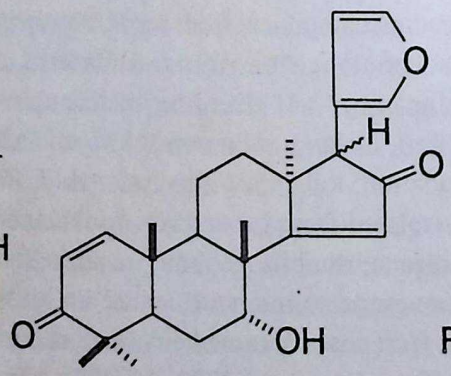
Nimbilin



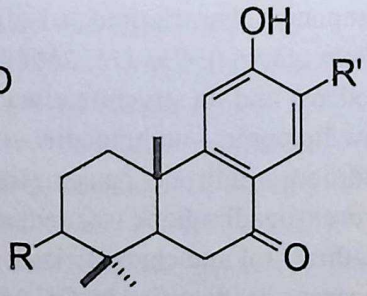
Nimbilicin



Nimbocidin



Nimbocinol
~ = α
17-Epinimbocinol
~ = β



Nimbosodione
R = H, R' = Ac
Nimbisonol
R = β-OH, R' = Me
Demethylnimbionol
R = β-OH, R' = OH

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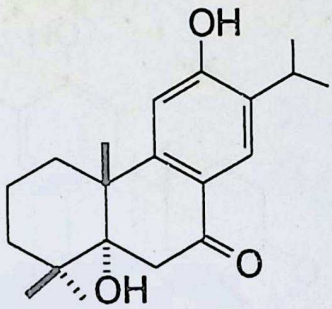
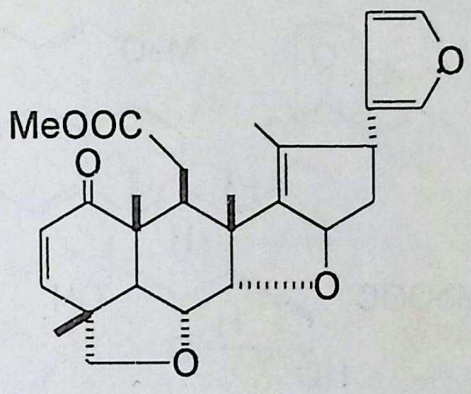
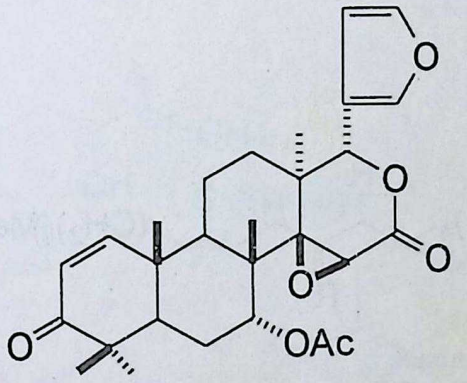


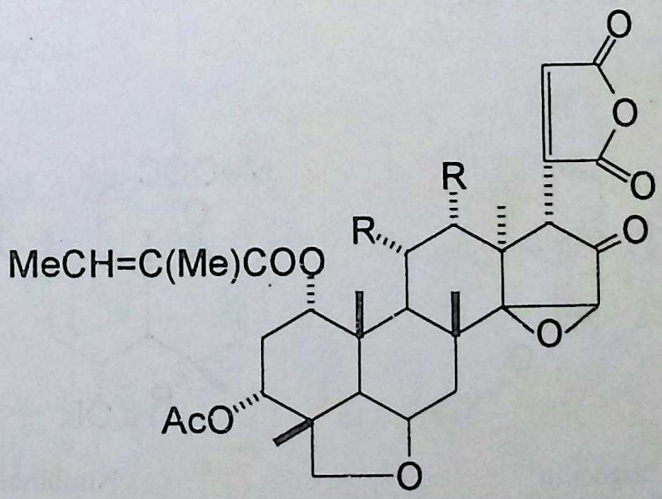
Nimolinin



28-Deoxynimbolide



Gedunin



Limbocinin
R = H
Limbocidin
R = OH

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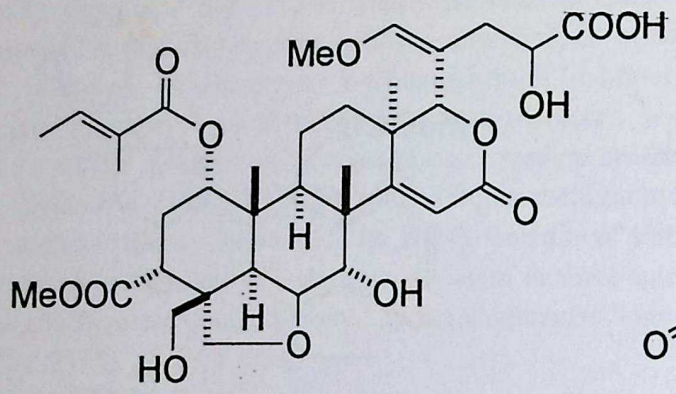
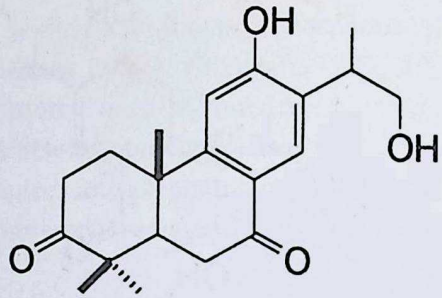
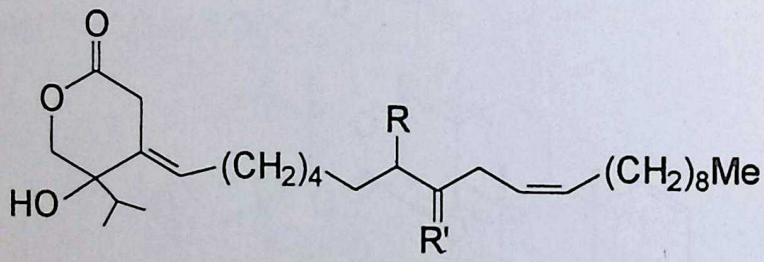


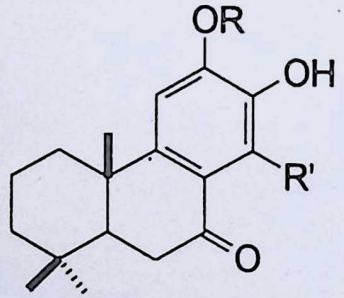
Limbonin



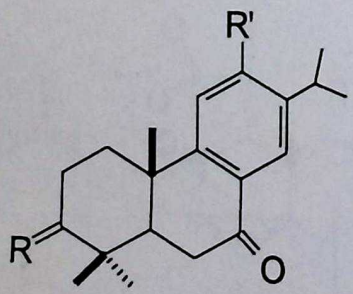
Margocinin



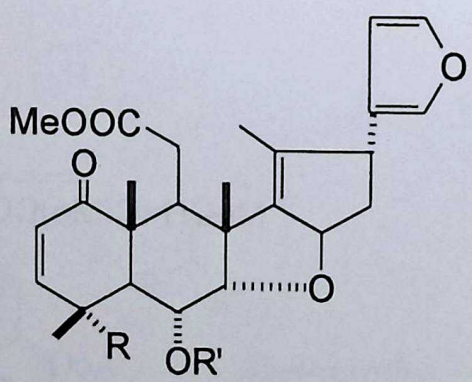
Margosinone
R = H, R' = O
Margosinolone
R = OH, R' = CH_2



Margosone
R = H, R' = $CHMe_2$
Margosolone
R = Me, R' = H



Margocilin
R = OH,H, R' = OH
Margocin
R = O, R' = H



Nimbinol
R = CH_2OH, R' = Ac
6-Deacetylnimbinal
R = CHO, R'= H

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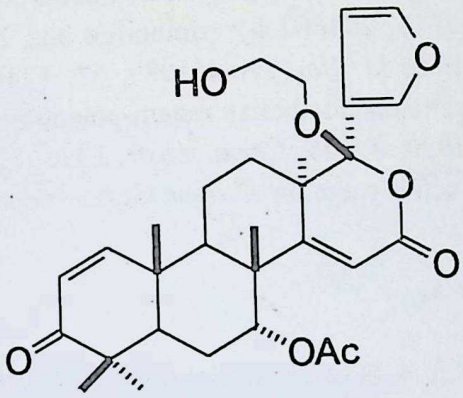
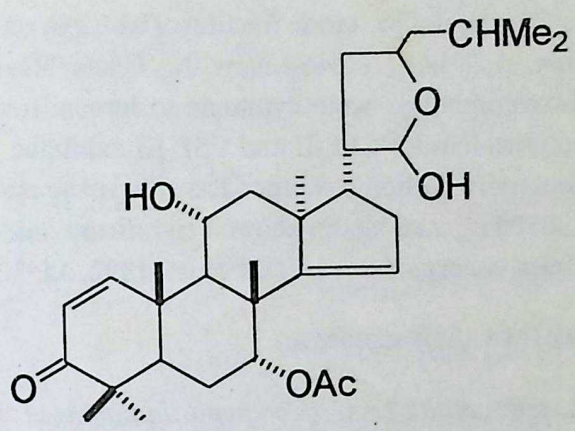
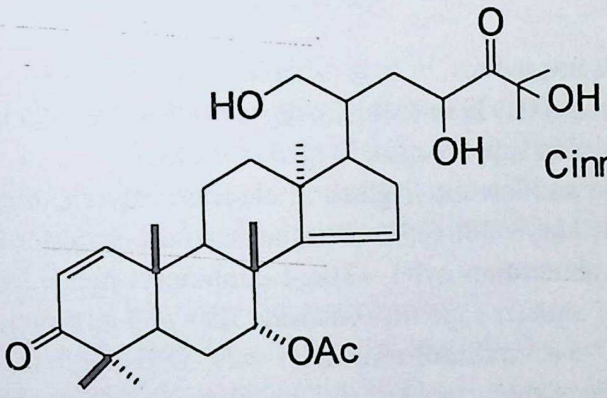


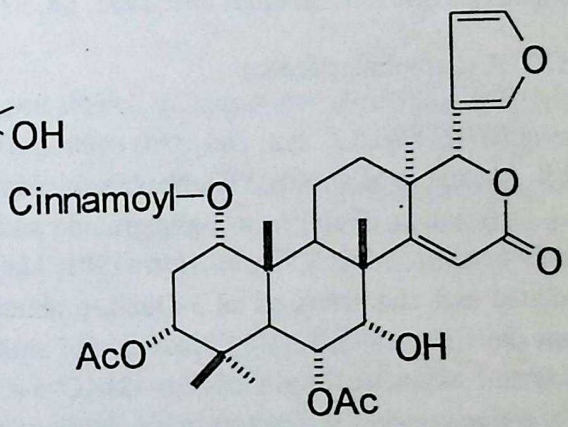
Mahmoodin



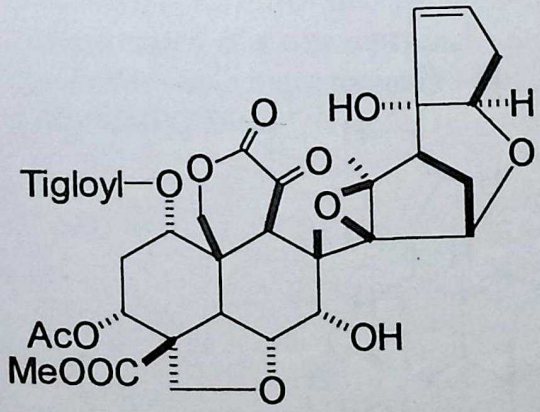
Naheedin



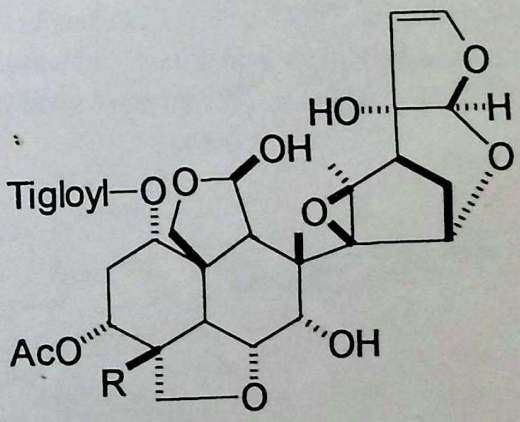
Azadirol



Azadirinin



Azadirachtin K



Azadirachtin H
R = COOMe
Azadirachtin I
R = Me

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BIOLOGICAL ACTIVITY

Polysaccharide fraction of bark extract showed antitumor activity against sarcoma cells (Jpn. 1,275,602 (1989) Nov. 06; *Chem. Abstr.* 1990, *112*, 204662 h); nimbolide and 28-deoxonimbolide were cytotoxic to human tumor cell lines (*J. Nat. Prod.* 1989, 52, 1246); polysaccharides CSP-II and CSP-III exhibited marked reticuloendothelial system-potentiating activity in carbon clearance test (*Shoyakugaku Zasshi* 1990, *44*, 29; *Chem. Abstr.* 1990, *113*, 178105 c); mahmodin showed significant antibacterial activity against various Gram +ve and Gram -ve organisms (*J. Nat. Prod.* 1992, *55*, 303).

AZIMA (Salvadoraceae)

A. tetracantha Lam. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 95).

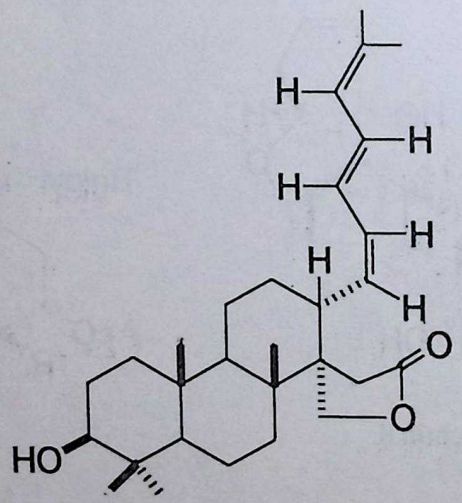
Seed oil contained ricinoleic acid (9.8), cyclopropenoid fatty acids (9.6%) and normal fatty acids (*J. Am. Oil Chemists Soc.* 1991, *68*, 978; *Chem. Abstr.* 1992, *116*, 55612 v).

BACOPA (Scrophulariaceae)

B. monnieri (L.) Wettst. syn. *Herpestis monniera* (L.) H.B. & K. (*Compend. Indian Med. Plants.* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 96).

Isolation of apigenin-7-glucuronide and luteolin-7-glucuronide from leaves (*Pharm. Acta Helv.* 1991, *66*, 153; *Chem. Abstr.* 1991, *115*, 89186 d); a new minor saponin - bacoside A1 - isolated and characterised as 3-O-α-L-arabinofuranosyl(1→3)-α-L-arabinosyl-jujubogenin (*Phytochemistry* 1993, *33*, 449); isolation of another saponin - bacoside A3 - and its structure elucidated as 3-O-β-D-glucosyl(1→3)-[O-α-L-arabinofuranosyl(1→2)]-O-β-D-glucosyl-jujubogenin; revision of structure of cis-isomer of ebelin lactone, obtained during acid hydrolysis as another artifact of jujubogenin (*Phytochemistry* 1994, *36*, 133).

NEW COMPOUNDS



Cis-ebelin lactone

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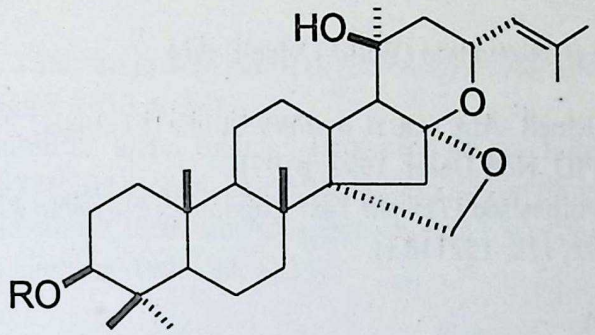


Bacoside A1
R = Ara(3→1)Ara
Bacoside A3
R = Glu[(2→1)Ara](3→1)Glu

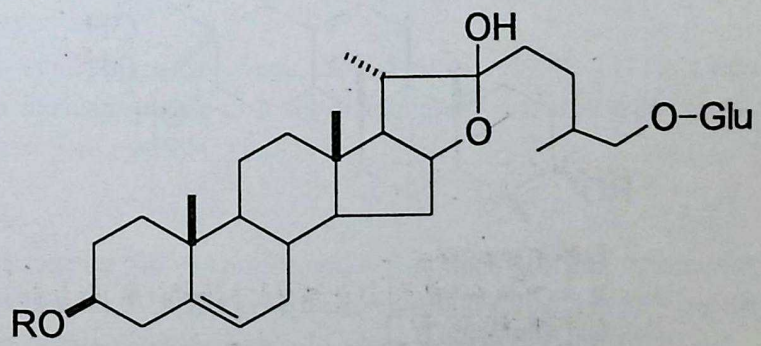
BALANITES (Balanitaceae)

B. aegyptiaca (L.) Delile syn. *B. roxburghii* Planch. (*Compend. Indian Med. Plants.* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 96).

Aqueous extract of fruits showed spermicidal activity without local vaginal irritation in human upto concentration of 4%; sperms became sluggish on contact with plant extract and then immobile within 30 sec, the effect was concentration-related (*Indian J. Pharmacol.* 1990, *22*, 262).

Four new cytostatic saponins - balanitins 4,5,6 and 7 - isolated from African plant and characterised as yamogenin-3β-O-β-D-glucosyl(1→4)-[α-L-rhamnosyl(1→2)]-β-D-glucopyranoside; yamogenin-3β-O-α-L-rhamnosyl(1→3)-β-D-glucosyl(1→4)-[α-L-rhamnosyl (1→2)]-β-D-glucopyranoside; yamogenin-3β-O-β-D-glucosyl(1→4)-[α-L-rhamnosyl(1→2)]-β-D-glucopyranoside and diosgenin-3β-O-β-D-xylosyl(1→3)-β-D-glucosyl(1→4)-[α-L-rhamnosyl(1→2)]-β-D-glucopyranoside (*J. Nat. Prod.* 1991, *54*, 1491); isolation and characterisation of a new sapogenol - 6-methyldiosgenin - and a new furostanol saponin - balanitoside - from fruits; balanitin 3 also isolated (*Phytochemistry* 1992, *31*, 3565).

NEW COMPOUNDS



Balanitoside
R = Glu(4→1)Glu(2→1)Rha

B. roxburghii Planch.; see *B. aegyptiaca* (L.) Delile

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BALIOSPERMUM (Euphorbiaceae)

B. axillare Blume; see *B. montanum* (Willd.) Muell.-Arg.

B. montanum (Willd.) Muell.-Arg. syn. *B. axillare* Blume (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 93).

Montanine synthesised (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1991, 33rd, 140; *Chem. Abstr.* 1992, *116,* 152113 r).

BAMBUSA (Poaceae)

B. arundinacea (Retz.) Willd.; see *B. bambos* (L.) Voss

B. bambos (L.) Voss syn. *B. arundinacea* (Retz.) Willd. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 89).

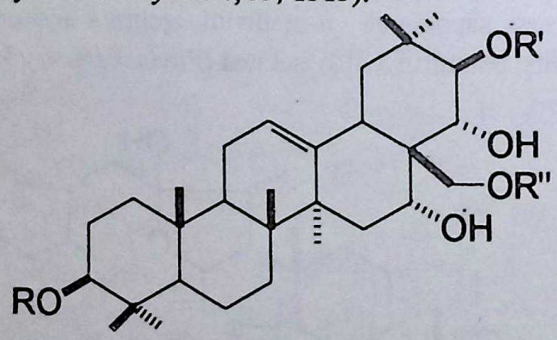
2,6-Dimethoxybenzoquinone, p-hydroxybenzaldehyde, 1,8-dihydroxy-3-methoxy-6-methylanthraquinone, allantoin, trans-p-hydroxycinnamic acid and fucosterol isolated from stem (*T'ai-wan K'o Hsueh* 1989, *42,* 21; *Chem. Abstr.* 1990, *113,* 55816 c).

BARRINGTONIA (Barringtoniaceae)

B. acutangula (L.) Gaertn. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 95).

A new triterpenoid glucoside isolated from seeds and characterised as 2α,3β,19α-trihydroxyolean-12-en-23,28-dioic acid-28-O-β-D-glucoside (*Phytochemistry* 1991, *30,* 4177); isolation of shikimic acid, gallic acid, β-sitosterol and its glucoside from flowers (*Indian J. Chem.* 1992, *31*B, 133); three monodesmosidic glucuronide saponins of barringtogenol C - barringtoside A, barringtoside B and barringtoside C- isolated from seeds as their methyl esters and their structures established (*Phytochemistry* 1994, *35,* 1315).

NEW COMPOUNDS



Barringtoside A
R = Gluc.acid[(2→1)Gal](3→1)Xyl, R',R'' = H
Barringtoside B
R = Gluc.acid[(2→1)Gal](3→1)Xyl, R' = Tigloyl, R'' = Isobutyryl
Barringtoside C
R = Gluc.acid[(2→1)Gal](3→1)Ara, R',R'' = H

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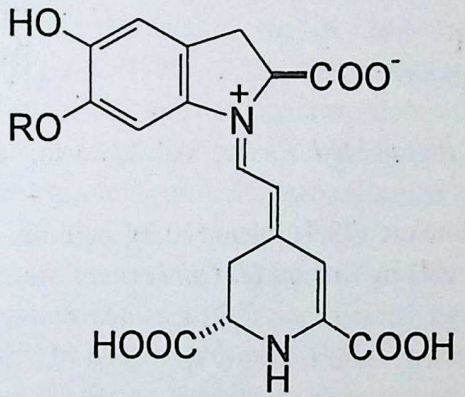
BASELLA (Basellaceae)

B. alba L. var. *rubra* (L.) Stewart syn. *B. rubra* L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 34).

Isolation of palmitic, oleic, linoleic, linolenic and arachidonic acids from seed oil (*Fitoterapia* 1992, *63,* 377); isolation of new betacyanins - isogomphrenin I and isogomphrenin II - from fruits and elucidation of their structures; gomphrenin I, gomphrenin II, and gomphrenin III also isolated (*Phytochemistry* 1993, *33*, 1525).

NEW COMPOUNDS



Isogomphrenin I
R = Glu
Isogomphrenin II
R = Glu (6-p-coumaroyl)

B. rubra L.; see *B. alba* L. var. *rubra* (L.) Stewart

BASSIA (Sapotaceae)

B. butyracea Roxb.; see *Madhuca butyracea* (Roxb.) Macbride

BAUHINIA (Caesalpiniaceae)

B. racemosa Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 99).

Pacharin synthesised (*J. Chem. Soc.* Perkin 1 1990, 1371); a new tetracyclic 2,2-dimethylchroman derivative - de-O-methylracemosol - isolated from roots and its structure determined (*Phytochemistry* 1994, *36,* 817).

B. rufescens Lamk.

Root bark extract showed antifungal activity against *Cladosporium cucumerinum.*

Four new antifungal tetracyclic compounds (I, II, III and IV) isolated from root bark and their crystal structures elucidated (*Helv. Chim. Acta* 1991, *74*, 791).

Distribution: Madhya Pradesh and Tamil Nadu, also in gardens elsewhere.

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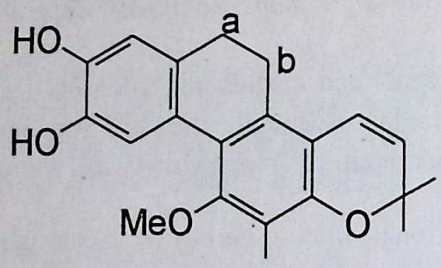
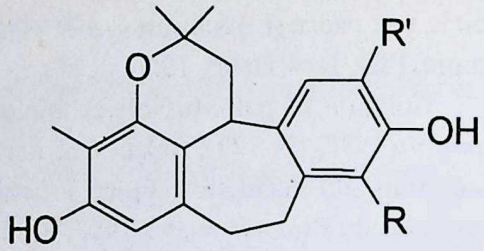
NEW COMPOUNDS





I
II
ab = Δ

III
R = OH, R' = H
IV
R = H, R' = OH

B. tomentosa L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 55).

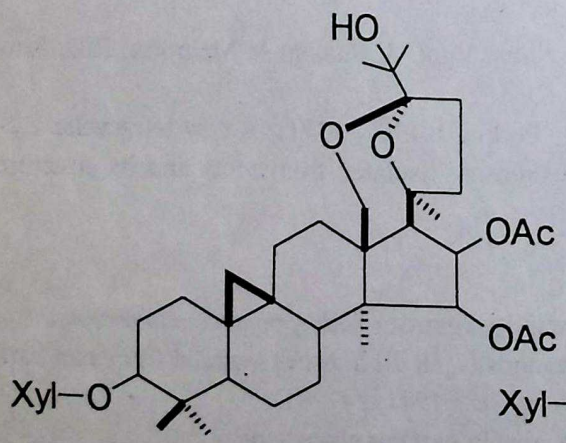
Determination of linoleic (49.9), oleic (20.7), palmitic (15.4), stearic (6.6), vernolic (5.8) and linolenic (1.6%) acids in seed oil (*J. Oil Technol. Assoc. India* 1991, *23*, 53; *Chem. Abstr.* 1992, *117*, 44630 u).

BEESIA (Ranunculaceae)

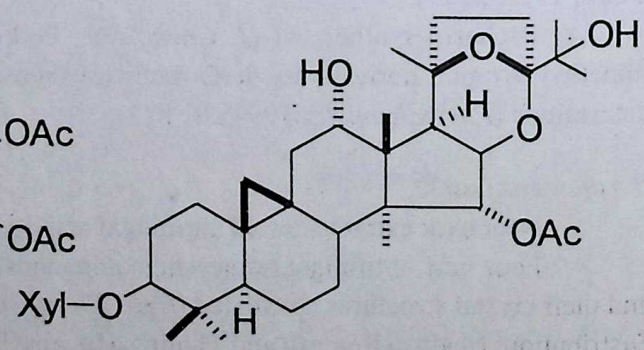
B. calthaefolia (Maxim. ex Oliver) Ulbrich (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 100).

Structure of beesioside IV elucidated as (20S,24S)15α-acetoxy-16β,24:20,24-diepoxy-9,19-cyclolanostane-3β,12α,25-triol-3-O-β-D-xylopyranoside (*Heterocycles* 1990, *30,* 897); structure determination of beesioside I from rhizomes as (20S,24S)15β,16β-diacetoxy-18,24:20,24-diepoxy-9,19-cyclolanostane-3β,25-diol-3-O-β-D-xylopyranoside (*Chem. Pharm. Bull.* 1993, *41*, 272).

NEW COMPOUNDS



Beesioside I



Beesioside IV

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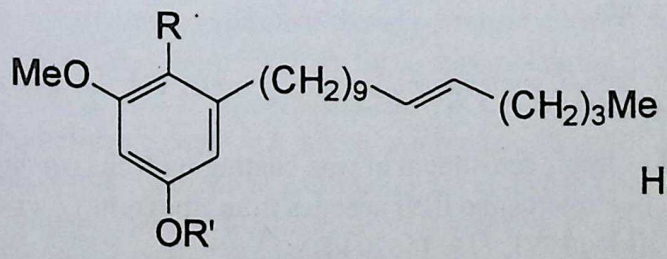
BELAMCANDA (Iridaceae)

B. chinensis (L.) DC. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 92).

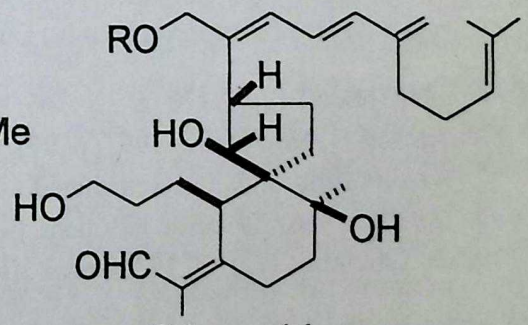
Aqueous extracts of leaves and rhizomes (0.1 g/kg, orally) provided 23.52 and 29.95% protection respectively to guinea pigs against histamine aerosol-induced bronchorelaxant activity. Ethanolic extracts of both parts (0.1 g/kg, orally) also showed significant protection (17.15 and 32.57% respectively) against histamine aerosol-induced preconvulsive dyspnoea (*Indian J. Pharmacol.* 1990, *22,* 107).

Isolation of tectorigenin, irigenin, tectoridin, iridin and 5,3'-dihydroxy-4',5'-dimethoxy-6,7-methylenedioxyisoflavone from rhizomes (*Saengyak Hakhoechi* 1989, *20,* 219; *Chem. Abstr.* 1990, *113,* 138369k; *Yaoxue Xuebao* 1992, *27,* 64; *Chem. Abstr.* 1992, *116,* 191100 d); a new isoflavone - belamcanidin - isolated and its structure determined; tectorigenin, irigenin, methylirisolidone, irisflorentin and iristectorigenin A also isolated (*Planta Med.* 1990, *56,* 335); dimethyltectorigenin, irisflorentin, muningin and iristectorigenins A and B isolated from rhizomes (*Saengyak Hakhoechi* 1991, *22,* 13; *Chem. Abstr.* 1991, *115,* 203332 a); isolation and structure elucidation of belamcandal (28-acetoxy-14,15-dihydro-26-hydroxy-19-methylidene-spiroirida-15,17-dienal), 28-deacetylbelamcandal and 16-O-acetyl-isoiridogermanal - from rhizomes and roots; (+)(6R,10S,11S,14S,26R)26-hydroxy-15-methylidene-spiroirid-16-enal, isoiridogermanal and fatty acid esters of above iridals (excluding 28-deacetylbelamcandal) also isolated; fatty acids found to be mixture of myristic, palmitic and stearic acids (*Phytochemistry* 1991, *30,* 3379); two new compounds - belamcandol A and belamcandol B - isolated from seeds and characterised as 2,4-dimethoxy-6-(10'(Z)pentadecenyl)phenol and 1-O-methyl-5-(10'(Z)-pentadecenyl) resorcinol respectively (*Chem. Pharm. Bull.* 1991, *39,* 1877); isolation of a new isoflavone - noririsflorentin - from rhizomes and its structure determination as 5-hydroxy-6,7-methylenedioxy-3',4',5'-trimethoxyisoflavone; rhaminocitrin and 5,7,3'-trihydroxy-8,4'-dimethoxyisoflavone also isolated (*Phytochemistry* 1993, *33,* 939); two new dimeric 1,4-benzoquinones - belamcandaquinone A and belamcandaquinone B - isolated from seeds and their structures determined (*Tetrahedron Lett.* 1993, *34,* 7633).

NEW COMPOUNDS



Belamcandol A
R = OH, R' = Me
Belamcandol B
R,R' = H



Belamcandal
R = Ac
28-Deacetylbelamcandal
R = H

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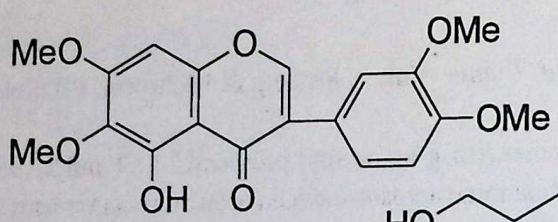
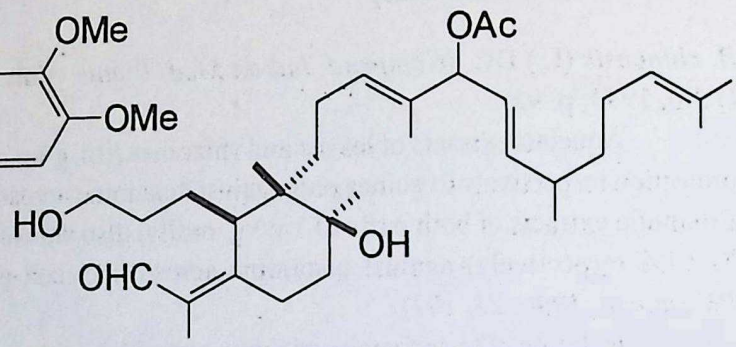
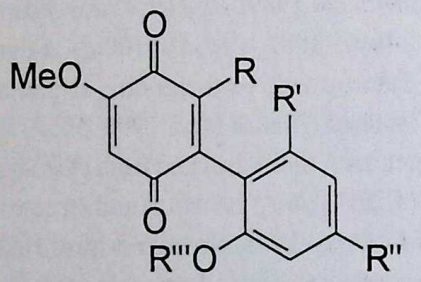


Belamcanidin

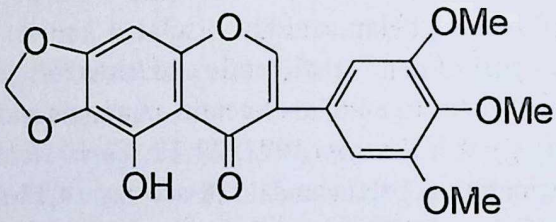


16-O-Acetyl-isoiridogermanal



Belamcandaquinone A
R,R'' =X, R' = OH, R''' = Me
Belamcandaquinone B
R,R' = X, R'' = OMe, R''' = H

X = $CH_2(CH_2)_8CH{=}CH(CH_2)_3Me$



Noririsflorentin

BIOLOGICAL ACTIVITY

Belamcandal stimulated throat mucous membrane (*Phytochemistry* 1991, *30*, 3379); belamcandol A inhibited 5-lipoxygenase activity, IC50 0.60 μM (*Chem. Pharm. Bull.* 1991, *39*, 1877); belamcandaquinone A showed cyclooxygenase inhibitory activity, IC50 8.33 μM (*Tetrahedron Lett.* 1993, *34*, 7633).

BENINCASA (Cucurbitaceae)

B. cerifera Savi; see *B. hispida* (Thunb.) Cogn.

B. hispida (Thunb.) Cogn. syn. *B. cerifera* Savi (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 97).

Isomultiflorenol acetate isolated as major constituent of wax coating on fruits (*Indian Drugs* 1991, *28*, 458); isolation of lupeol, β-sitosterol and their acetates from ripe fruits (*J. Inst. Chemists,* Calcutta 1992, *64*, 123; *Chem. Abstr.* 1993, *119*, 156204 f).

BERBERIS (Berberidaceae)

B. aristata DC. var. *aristata* (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID,

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New Delhi, 1993, p. 92).

Quercetin, E-caffeic acid , rutin, chlorogenic acid and meratin isolated from flowers (*J. Indian Chem. Soc.* 1992, *68,* 531).

B. aristata Hook.f. & Thoms.; see *B. chitria* Lindl.

B. chitria Lindl. syn. *B. aristata* sensu Hook.f. & Thoms, p.p. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 101).

Structure of antimalarial alkaloid - jatrorrhizine - determined (*Acta Crystallogr., Cryst. Struct. Commun.* 1993, *49*C, 1665; *Chem. Abstr.* 1993, *119,* 271458 d).

BIOLOGICAL ACTIVITY

Jatrorrhizine showed negative chronotropic and positive inotropic effects concentration-dependently on isolated guinea pig atria. Time to peak tension and relaxation time were increased. At 50.0 μM it prolonged functional refractory period of left atrium but excitability was not affected (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1989, *3,* 255; *Chem. Abstr.* 1990, *112,* 69640 g).

B. lycium Royle (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 102).

BIOLOGICAL ACTIVITY

Berberine (1.0 and 2.0 mg/kg) prevented $BaCl_2$-induced ventricular arrhythmia in winstar rats. It also increased the required doses of aconitine and ouabain for induction of ventricular premature beats, ventricular tachycardia, ventricular fibrillation and cardiac arrest. Effects of berberine on ventricular arrhythmia were similar to that of quinidine (*Zhongguo Yaoxue Zazhi* 1990, *25,* 335; *Chem. Abstr.* 1990, *113,* 204652 a); berberine blocked presynaptic α_2 and postsynaptic α_1 adrenergic receptors in isolated rat anococcygens muscle and vas deferens with pA2 value of 5.34 and 6.23 respectively (*Zhongguo Yaoke Daxue Xuebao* 1990, *21,* 309; *Chem. Abstr.* 1991, *114,* 135802 f); berberine sulphate (4.0 mg/kg, i.v.) had no effect on heart rate (HR) but lowered blood pressure (BP) in normal rats. It decreased both HR and BP in vagotomised rats and decreased HR but had no effect on BP in pithed rats. It showed negative chronotropic effect in isolated guinea pig right atrium (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1991, *5,* 12; *Chem. Abstr.* 1991, *114,* 178120 z); administration of berberine sulphate, s.c., prolonged survival time of mice under condition of closed normobaric hypoxia. It antagonised effect of decreased survival time of mice by i.p. isoprenaline or phentolamine in closed normobaric hypoxia, and prolonged survival time in mice poisoned by KCN, $NaNO_2$ or lidocaine. In comparison, the effects of berberine i.g. were less potent. Antianoxic effects of berberine may be due to decreasing oxygen consumption by body and raising its ability to utilize oxygen in hypoxia (*Zhongguo Yaolixue Tongbao* 1991, *7,* 70; *Chem. Abstr.* 1992, *116,* 453 p); berberine produced concentration-dependent inhibition of action potential of SA node in guinea pig. It (10.0 mg/kg, i.v.) also increased cardiac refractory period *in vivo* in rabbit (*Zhongguo Yaoli Xuebao* 1991, *12,* 40; *Chem. Abstr.* 1991, *114,* 94902 t); berberine (1.0 to 4.0 mg/kg, i.v.) markedly and in dose-dependent manner reduced ventricular arrhythmia after coronary artery occlusion in rats. It also depressed at 4.0 mg/kg

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abnormal changes in haemorrheology. Thus, berberine might produce antagonistic effect on ventricular arrhythmia following myocardial ischemia (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1993, *7,* 108; *Chem. Abstr.* 1993, *119,* 108644 c); berberine (3.0 to 30.0 μM) increased duration of action potential of dog cardiac purkinje and ventricular muscle fibres. At 30.0 μM, it also increased duration of slow responses in K-depolarised rabbit atrial muscle fibres thereby suggesting that it possesses anti- and pro-arrhythmic action *in vitro* in dog cardiac muscles (*Brit. J. Pharmacol.* 1993, *108,* 534).

B. orthobotrys Bien. ex Aitch. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 103).

BIOLOGICAL ACTIVITY

Berbamine (1.0 to 100.0 μM) showed antioxidant activity *in vitro* as evidenced by inhibition of malondialdehyde formation in mouse liver homogenate preparation. It also effectively scavenged O^{2-} in xanthine-xanthine oxidase system (*Zhongguo Yaoli Xuebao* 1990, *11,* 539; *Chem. Abstr.* 1991, *114,* 17329 j); berbamine produced cardiac depression in isolated guinea pig heart preparation. It also antagonised adrenaline-induced arrhythmia (*Zhongguo Yaolixue Tongbao* 1991, *7,* 67; *Chem. Abstr.* 1992, *116,* 452 n); berbamine (0.3 to 1.0 μM) produced cardiac depression in isolated guinea pig heart preparation. It appears to act like verapmil (*Asia Pac. J. Pharmacol.* 1991, *6,* 37; *Chem. Abstr.* 1991, *115,* 474 a).

B. vulgaris L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 103).

Isolation of berlambine, lambertine, berbamunine, berberine, berbamine, yuziphine, columbamine, palmatine and hydroxyacanthine from roots (*Khim. Prir. Soedin.* 1990, 128; *Chem. Abstr.* 1990, *112,* 213916 w).

BERGENIA (Saxifragaceae)

B. purpurascens (Hook.f. & Thoms.) Engl. syn. *Saxifraga purpurascens* Hook.f. & Thoms. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.103).

An improved method for extraction of bergenin developed (*Zhongguo Yiyao Gongye Zazhi* 1991, *22,* 346; *Chem. Abstr.* 1992, *116,* 91214 a).

BETULA (Betulaceae)

B. acuminata Wall.; see *B. alnoides* Buch.-Ham. ex D.Don

B. alnoides Buch.-Ham. ex D.Don syn. *B. acuminata* Wall. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 37).

Determination of methyl salicylate (98.2%) in essential oil of bark of plant growing in north-eastern region of India (*J. Essent. Oil Res.* 1991, *3,* 463; *Chem. Abstr.* 1992, *116,* 37979 r).

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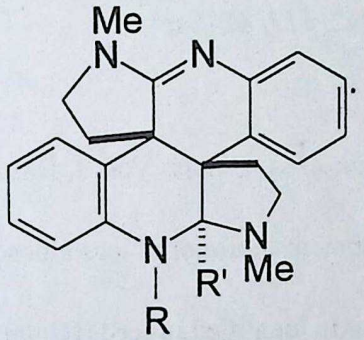
BHESA (Celastraceae)

B. paniculata Arn. syn. *Kurrimia paniculata* Wall.ex Arn.

Two new alkaloids - bhesine and dehydrobhesine - possessing an iso-calycanthine skeleton isolated from bark and their structures determined by X-ray studies (*Nat. Prod. Lett.* 1993, *2*, 61; *Chem. Abstr.* 1994, 120, 319351 p.)

Distribution: South India.

NEW COMPOUNDS



Bhesine
R,R' = H
Dehydrobhesine
RR' = Δ

BIDENS (Asteraceae)

B. bipinnatus L. (*bipinnata*) syn. *B. pilosa* L. var. *bipinnata* (L.) Hook.f.

A new polyacetylene glycoside - bipannatpolyacetyloside - isolated from leaves and characterised as 3E,11E-diethylene-5,7,9-triacetylene-1,13-tridecanglycol-2-O-β-D-glycoside (*Chinese Chem. Lett.* 1992, *3*, 287; *Chem. Abstr.* 1992, *117*, 108117 s); isolation of hyperoside, isookanin-7-O-β-D-glycoside, okanin and maritimein from leaves (*Zhongcaoyao* 1992, *23*, 229; *Chem. Abstr.* 1992, *117*, 108172 f).

Distribution: Throughout India, ascending to 1800 m in the hills.

B. pilosa L. var. *bipinnata* (L.) Hook.f.; see *B. bipinnatus* L.

B. tripartita L. var. *tripartita (tripartitus)* (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 100).

A new chalcone - 2'-hydroxy-4,4'-dimethoxychalcone - isolated from green parts and flower heads along with linoleic acid, eugenol, ocimene, three polyacetylenes and two thiophene derivatives (*Phytochemistry* 1990, *29*, 3155).

BIOTA (Cupressaceae)

B. orientalis Endl.; see *Thuja orientalis* L.

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BISCHOFIA (Euphorbiaceae)

B. javanica Blume (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 104).

Stigmasterol, β-sitosterol and β-sitostenone isolated from wood whereas β-sitosterol, friedelin, friedelan-3α-yl acetate and n-hentriacontane isolated from leaves (*Mokuzai Gakkaishi* 1992, *38,* 204; *Chem. Abstr.* 1992, *117,* 4241 m).

BIOLOGICAL ACTIVITY

Friedelin strongly inhibited growth of radicle of *Raphanus sativus* (*Mokuzai Gakkaishi* 1992, *38,* 204; *Chem. Abstr.* 1992, *117,* 4241 m).

BIXA (Bixaceae)

B. orellana L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 96).

Hot water extract was potent inhibitor of lens aldose reductase activity (*Chem. Pharm. Bull.* 1991, *39,* 3346).

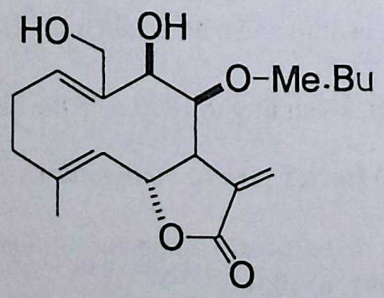
Geranylgeraniol and bixin identified in seeds (*Quim. Nova* 1989, *12,* 297; *Chem. Abstr.* 1990, *112,* 155274 x); isolation of farnesylacetone, geranylgeranyl octadecanoate, geranylgeranyl formate, δ-tocotrienol and apocarotenoid from seeds (*Phytochemistry* 1989, *28,* 3159); isoscutellarein and 3,5-dicaffeoylquinic acid isolated (*Chem. Pharm. Bull.* 1991, *39,* 3346).

BLAINVILLEA (Asteraceae)

B. acmella (L.) Philip. syn. *B. latifolia* (L.f.) DC. ex Wight (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.105).

A new germacranolide (I) isolated and characterised as 10-acetoxymethyl-9β-hydroxy-8β-(2-methylbutyryloxy)-germacradien-6,7-olide (*Phytochemistry* 1994, *36,* 399).

NEW COMPOUNDS



I

B. latifolia (L.f.) DC. ex Wight; see *B. acmella* (L.) Philip.

BLECHNUM (Blechnaceae)

B. orientale L.

Four lignans - blechnic, 7-epiblechnic, 8-epiblechnic and brainic acids isolated and

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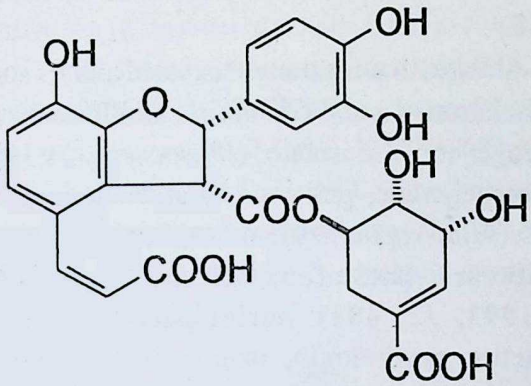
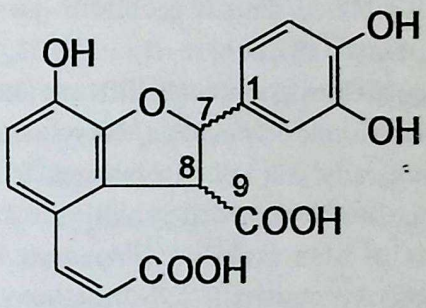
their structures determined (*Chem. Pharm. Bull.* 1992, *40*, 2099).
Distribution: Himalayas, from Garhwal to Sikkim, and Kerala.
NEW COMPOUNDS



Brainic acid



Blechnic acid
~~ (7) = α, ~~ (8) = α
7-Epiblechnic acid
~~ (7) = β, ~~ (8) = α
8-Epiblechnic acid
~~ (7) = α, ~~ (8) = β

BLEPHARIS (Acanthaceae)

B. edulis Pers.; see *B. persica* (Burm.) O. Kuntze

B. persica (Burm.) O. Kuntze syn. *B. edulis* Pers. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 102).

A benzoxazine glucoside - blepharin - isolated from seeds (*Indian J. Chem.* 1990, *29*B, 132); synthesis of blepharin (*Indian J. Chem.* 1990, *29*B, 603).

BLUMEA (Asteraceae)

B. balsamifera (L.) DC. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 108).

(2R,3R)7,5'-Dimethoxy-3,5,2'-trihydroxyflavanone isolated from aerial parts (*Phytochemistry* 1992, *31*, 4040).

B. lanceolaria (Roxb.) Druce var. *lanceolaria* syn. *B. myriocephala* DC. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 109).

p-Cymene (98.74%) determined in essential oil (*Indian Perfum.* 1989, *33*, 38; *Chem. Abstr.* 1990, *112*, 145389 z); determination of methyl thymol (95.0%) in oil by GC-MS (*J. Essent. Oil Res.* 1991, *3*, 285; *Chem. Abstr.* 1992, *116*, 55522 r).

B. myriocephala DC.; see *B. lanceolaria* (Roxb.) Druce var. *lanceolaria*

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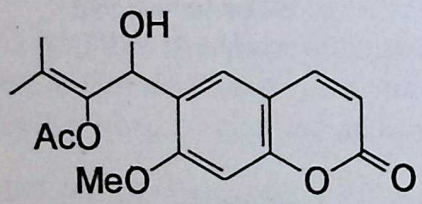
BOENNINGHAUSENIA (Rutaceae)

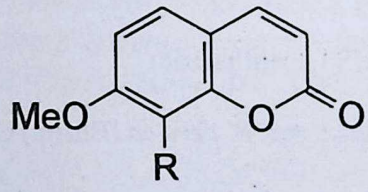
B. albiflora (Hook.) Reichb. ex Meissn. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 98).

A new dimeric coumarin - jayantinin - alongwith murralongin isolated and its structure determined (*Phytochemistry* 1989, *28*, 1281); isolation of a new coumarin - albiflorin 1 - and its structure elucidation; umbelliferone and dehydrogeijerin also isolated (*Phytochemistry* 1991, *30*, 2094); bicyclogermacrene, bicycloelemene, pregeijerene, geijerene, δ-elemene and 3-(1,1-dimethylallyl)xanthyletin isolated from roots (*Fitoterapia* 1991, *62*, 277); two new minor diastereomeric coumarins - albiflorin 2 and albiflorin 3 - isolated and their structures established; komalin also isolated (*Phytochemistry* 1993, *32*, 481); aerial parts afforded 5,7-dimethoxycoumarin, 5,8-dimethoxyxanthyletin, xanthotoxin, isopimpinellin and 5,7,8-trimethoxycoumarin whereas roots contained 5,8-dimethoxyxanthyletin and (S)(+)chalepin acetate (*Planta Med.* 1993, *59*, 384).

NEW COMPOUNDS



Albiflorin 1



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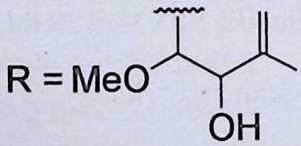
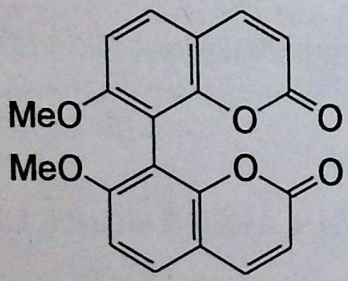
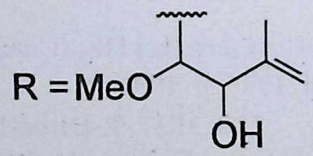




Jayantinin

Albiflorin 3



BOERHAVIA (BOERHAAVIA) (Nyctaginaceae)

B. diffusa L. syn. *B. repens* L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 111).

Chloroform and methanolic extracts of roots and aerial parts exhibited hepatoprotective activity against CCl_4-intoxication in rats; a rotenoid, a steroid and a flavone retaining hepatoprotective activity were also obtained (*Indian Drugs* 1989, *27*, 161).

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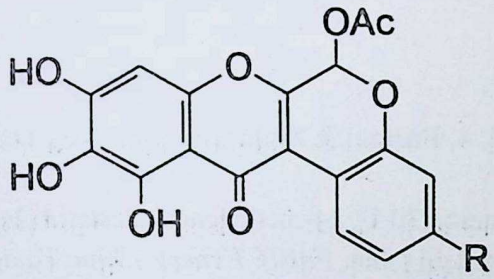
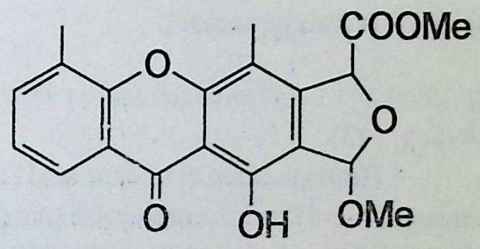
Two new rotenoids - boeravinone A and boeravinone B - isolated from roots of plant collected from Nepal; sitosterol, stigmasterol, campesterol and their glucosides and methyl esters of palmitic, heptadecylic, oleic, stearic, arachidic and behenic acids also isolated (*Chem. Pharm. Bull.* 1989, *37*, 3214); isolation of a new 12a-hydroxyrotenoid - boeravinone C - from roots and determination of its structure and absolute configuration (*Chem. Pharm. Bull.* 1990, *38*, 1558); two new rotenoids - repenone and repenol - isolated and their structures established (*Phytochemistry* 1990, *29*, 1709); isolation of liriodendrin and syringaresinol-β-D-glucoside from roots (*Chem. Pharm. Bull.* 1991, *39*, 1551); isolation and structure determination of three new rotenoids - boeravinones D, E and F - from roots (*Chem. Pharm. Bull.* 1991, *39*, 1863); borhavine isolated from roots and characterised as methyl 3,10-dihydro-11-hydroxy-1-methoxy-4,6-dimethyl-10-oxo-1H-furo[3,4-b]xanthene-3-carboxylate (*Phytochemistry* 1992, *31*, 4382).

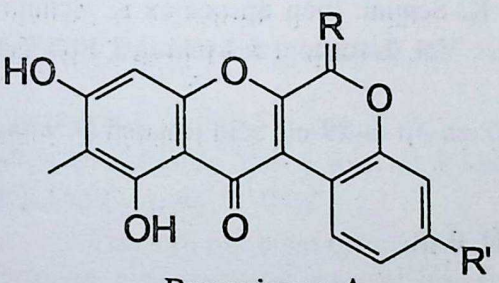
NEW COMPOUNDS



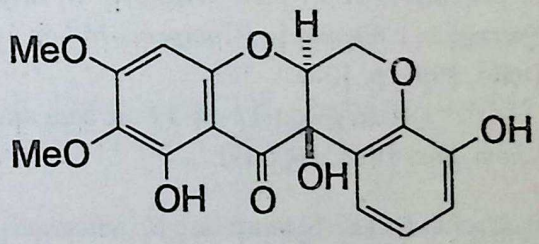
Reperone
R = H
Repenol
R = OH



Borhavine



Boeravinone A
R = H,OMe, R' = H
Boeravinone B
R = H,OH, R' = H
Boeravinone D
R = H,OMe, R' = OH
Boeravinone E
R = H,OH, R' = OH
Boeravinone F
R = O, R' = OH



Boeravinone C

BIOLOGICAL ACTIVITY

Liriodendrin exhibited significant Ca^{2+} channel antagonistic effect in frog heart single

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cell (*Chem. Pharm. Bull.* 1991, *39*, 1551).

B. repens L.; see *B. diffusa* L.

BOMBAX (Bombacaceae)

B. ceiba L. syn. *Salmalia malabarica* (DC.) Schott. & Endl., *Bombax malabaricum* DC. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 113).

An electrophoretically homogeneous polysaccharide isolated from defatted seeds, composed of galactose and arabinose in ratio of 7:3 (*Carbohydr. Res.* 1990, *207*, 336; *Chem. Abstr.* 1991, *114*, 3483 t).

B. malabaricum DC.; see *B. ceiba* L.

BORAGO (Boraginaceae)

B. officinalis L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 113).

Determination of linoleic acid (32.4), campesterol (30.1), 24-methylenecholesterol (24.5), sitosterol (23.2) and avenasterol-5-ene (19.8%) in seed oil (*Ann. Falsif. Expert. Chim. Toxicol.* 1992, *85*, 231; *Chem. Abstr.* 1993, *118*, 232615 n).

BORRERIA (Rubiaceae)

B. articularis (L.f.) F.N. Will. syn. *B. hispida* (L.) K. Schum. (non Spruce ex K. Schum.), *Spermacoce hispida* L. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 105).

3-Keto-olean-12-en-29-oic acid and olean-12-en-3β-ol-29-oic acid isolated (*J. Indian Chem. Soc.* 1993, *70*, 609).

B. hispida (L.) K. Schum.; see *B. articularis* (L.f.) F.N. Will.

B. ocymoides (Burm.f.) DC. syn. *Spermacoce ocymoides* Burm.f.

Aqueous and alcoholic extracts of leaves inhibited *Staphylococcus aureus, Klebsiella pneumoniae, Proteus mirabilis, Pseudomonas aeruginosa, Escherichia coli* and *Neisseria gonorrhoeae* (*J. Appl. Bacteriol.* 1991, *71*, 398; *Chem. Abstr.* 1992, *116*, 91208 b).
Distribution: Western peninsular India.

BOSWELLIA (Burseraceae)

B. serrata Roxb. ex Coleb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 114).

Isolation of 4-O-methylglucurono-arabinogalactan from resin (*Carbohydr. Res.* 1992, *223*, 321; *Chem. Abstr.* 1992, *116*, 191040 j).

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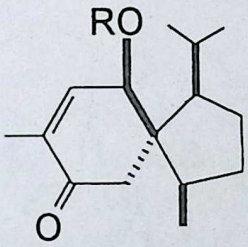
BOTHRIOCHLOA (Poaceae)

B. bladhii (Retz.) S.T. Blake syn. *Amphilophis odorata* A. Camus, *Bothriochloa odorata* (Lisboa) A. Camus (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p.16).

Isolation of two new sesquiterpenes having spiro [4.5]decane skeleton - 10-acetoxyacorenone B and 10-hydroxyacorenone B - and elucidation of their structures (*Proc.-Int. Congr. Essent. Oils, Fragrances Flavours,* 11th 1989, 265; *Chem. Abstr.* 1992, *117,* 188238 v); determination of acorenone B (18.2), farnesol (8.52), β-eudesmol (8.37), geranyl butyrate (7.20) and caryophyllene oxide (4.50%) in oil (*J. Essent. Oil Res.* 1993, *5,* 325; *Chem. Abstr.* 1993, *119,* 146432 q).

NEW COMPOUNDS



10-Hydroxyacorenone B
R = H
10-Acetoxyacorenone B
R = Ac

B. odorata (Lisboa) A. Camus; see *B. blandhii* (Retz.) S.T. Blake

BOTRYCHIUM (Botrychiaceae)

B. ternatum (Thunb.) Sw. syn. *Sceptridium ternatum* (Thunb.) Lyon. var. *ternatum* (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 115).

BIOLOGICAL ACTIVITY

Ternatin inhibited cytopathic effect of DNA and RNA viruses and reduced infectivity of viruses. Amongst viruses tested, it was active against DNA viruses especially adenovirus but markedly effective against naked viruses especially poliovirus (*J. Nat. Prod.* 1990, *53,* 989).

BOUCEROSIA (Asclepiadaceae)

B. aucheriana Decne.; see *Caralluma tuberculata* N.E. Brown

BRAINEA (Blechnaceae)

B. insignis (Hook.) J. Sm.

Blechnic, 7-epiblechnic, 8-epiblechnic and brainic acids isolated (*Chem. Pharm. Bull.* 1992, *40,* 2099).

Distribution: Meghalaya.

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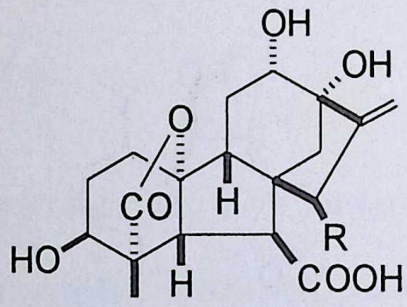
BRASSICA (Brassicaceae)

B. campestris L. (*Compend. Indian Med. Plants,* Vol.4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 116).

Isolation of isorhamnetin-3-O-β-D-glucopyranoside and trans-sinapoylmalic acid from leaves (*Agric. Biol. Chem.* 1990, *54,* 1053); structures of new gibberellins GA85 and GA86 confirmed by synthesis (*Tetrahedron Lett.* 1991, *32,* 6203); brassicasterol synthesised (*Huaxue Xuebao* 1992, *50,* 1192; *Chem. Abstr.* 1993, *118,* 192092 f).

NEW COMPOUNDS



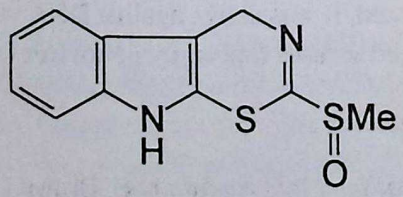
Gibberellin GA85
R = H
Gibberellin GA86
R = OH

B. campestris L. ssp. *napus* (L.) Hook.f. & Thoms.; see *B. napus* L.

B. juncea (L.) Czern. & Coss. (*Compend. Indain Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 116).

A S-containing phytoalexin - cyclobrassinin sulphoxide - isolated from leaves and its structure determined (*Phytochemistry* 1990, *29,* 1087).

NEW COMPOUNDS



Cyclobrassinin sulphoxide

B. napus L. syn. *B. campestris* L. ssp. *napus* (L.) Hook.f. & Thoms. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 117).

Synthesis of brassinolide (*Chem. Commun.* 1989, 612); 9'(Z)neoxanthin , (E)- and 9(Z)violaxanthins and 8'(R) and 8'(S)luteoxanthins isolated from petals (*Chimia* 1991, *45,* 27; *Chem. Abstr.* 1991, *114,* 225698 f).

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B. oleracea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 117).

New flavonol glycoside - kaempferol-3-O-β-D-[2E-p-coumaroyl-β-D-glucosyl (1→2)-glucopyranoside]-7-O-β-D-glucopyranoside, kaempferol-3-O-β-D-[2E-caffeoyl-β-D-glucosyl-(1→2)-glucopyranoside]-7-O-β-D-glucopyranoside, quercetin-3-O-β-D-[2E-feruloyl-β-D-glucosyl(1→2)-glucopyranoside]-7-O-β-D-glucopyranoside and quercetin-3-O-β-D-[2E-caffeoyl-β-D-glucosyl(1→2)-glucopyranoside]-7-O-β-D-glucopyranoside - isolated from leaves; kaempferol-3-O-β-D-[glucopyranosyl(1→2)-glucopyranoside]-7-O-β-D-glucopyranoside, kaempferol-3-O-β-D-[2-sinapoyl-β-D-glucosyl(1→2)-glucopyranoside]-7-O-β-D-glucopyrannoside and kaempferol-3-O-β-D-[2E-feruloyl-β-D-glucosyl(1→2)-glucopyranoside]-7-O-β-D-glucopyranoside also isolated (*Phytochemistry* 1993, *34,* 539).

B. oleracea L. var. *botrytis* L.

Eng. - Cauliflower; H. - Phoolgobhi; Beng. and Guj. - Fulkopi; Kan. - Hoovina-kosu; Mar. - Fulavar; Tam. - Gospoovu; Tel. - Poorobi.

A new antimutagenic compound - S-methyl methanethiosulphonate - isolated (*Biol. Pharm. Bull.* 1993, *16,* 207; *Chem. Abstr.* 1993, *119,* 4980 t).

Distribution: Cultivated throughout India upto 2000 m.

BIOLOGICAL ACTIVITY

S-Methyl methanethiosulphonate showed antimutagenic acitvity when tested against *Escherichia coli* (*Biol. Pharm. Bull.* 1993, *16,* 207; *Chem. Abstr.* 1993, *119,* 4980 t).

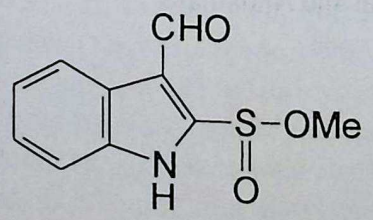
B. oleracea L. var. *capitata* L.f.

Eng. - Cabbage; H. - Bandgobhi, Pattagobhi; Beng. - Bandhakapi, Kopi; Guj. - Kobij; Kan. - Yelekosu; Mal. - Muttakose; Mar. - Kobi; Mundari - Arakubi, Kubiafa; Oriya - Bandhakobi; Assam - Bandhakobi; Tam. - Muttaikose; Tel. - Aalugobi.

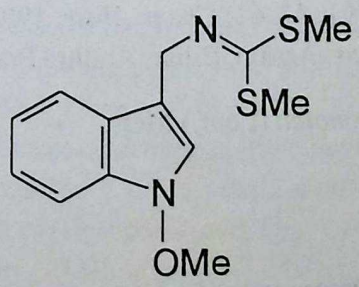
Isolation of new sulphur-containing phytoalexin - brassicanal C - and two dioxindoles - (-)3-cyanomethyl-3.-hydroxyoxindole and dioxibrassinin - from cabbage inoculated with *Pseudomonas cichorii* and their structure determination (*Phytochemistry* 1991, *30,* 2915); two stress metabolites - methoxybrassenin A and methoxybrassenin B - isolated from plant inoculated with *Pseudomonas cichorii* and their structures determined (*Phytochemistry* 1991, *30,* 3921).

Distribution: Cultivated throughout India, upto 1800 m.

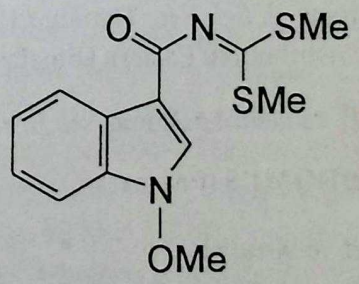
NEW COMPOUNDS



Brassicanol C



Methoxybrassenin A



Methoxybrassenin B

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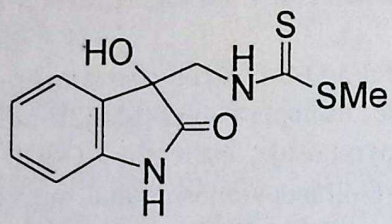
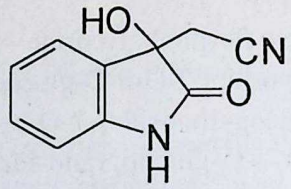


Dioxibrassinin



(-)3-Cyanomethyl-3-hydroxyoxindole

B. oleracea L. var. *gongylodes* L.

Eng. - Knol-khol, Kohlrabi; H. - Ganth gobhi; Beng. - Olkapi; Guj. - Nolkol; Kan. - Kosugadde; Mar. - Nawal kol; Oriya - Ganthikobi, Olkobi; Tam. - Noolkhol; Tel. - Gaddagobi, Noolkhol; Assam - Olkobi; P. - Gandgobi.

Isolation of 3-, and 4-methylthiobutyl and allyl thiocyanates, 3- and 4-methylthiobutyl cyanides and dimethyl, trimethyl and tetramethyldisulphides from bulbs; n-nonenal, (E)2-hexenal and (E,E)2,4-heptadienal also present as minor constituents (*Z. Lebensm.-Unters. Forsch.* 1992, *194*, 259; *Chem. Abstr.* 1992, *117*, 68794 b).

Distribution: Cultivated throughout India upto 2000 m.

B. tournefortii Gouan

H. - Rai.

Triglycerides (85.0%) present in seeds; major constituents 1,3-dierucic-2-linolenin and 1,3-dierucic-2-linolein identified (*Grasas Asceites* 1990, *41*, 428; *Chem. Abstr.* 1991, *115*, 5126 y).

Distribution: Rajasthan, Delhi and Punjab.

BRIDELIA (Euphorbiaceae)

B. monoica (Lour.) Merr. syn. *B. tomentosa* Blume

Assam - Patkunki; Beng. - Mindri, Sirai; Mikir - Jhebitra arong; Khasi - Dieng-soh-puet-paraosynrang.

Isolation and structure elucidation of a new triterpene - 24-methyllanosta-9(11),25-dien-3-one - from roots; 24,24-dimethyllanosta-9(11), 25-dien-3-one also isolated (*J. Nat. Prod.* 1990, *53*, 209; *J. Sci. Soc. Thailand* 1991, *17*, 61; *Chem. Abstr.* 1993, *118*, 230180 t); β-sitosterol, stigmasterol and their 3-O-glucosides, friedelin, friedelin-3β-ol and triacanthine isolated from roots (*J. Sci. Soc. Thailand* 1991, *17*, 61; *Chem. Abstr.* 1993, *118*, 230180 t).

Distribution: Eastern Himalayas, Assam, Bihar, Andhra Pradesh and Andamans.

B. tomentosa Blume; see *B. monoica* (Lour.) Merr.

BROMUS (Poaceae)

B. tectorum L.

Eng. - Cheat grass, Drooping broome grass.

Thirteen fructan oligomers isolated from leaves of which two were trisaccharides, four

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tetrasaccharides, three pentasaccharides and four hexasaccharides and their structures established, all composed of 1-kestose and 6-kestose units (*New Phytol.* 1993, *124,* 389; *Chem. Abstr.* 1994, *120,* 240081 s).

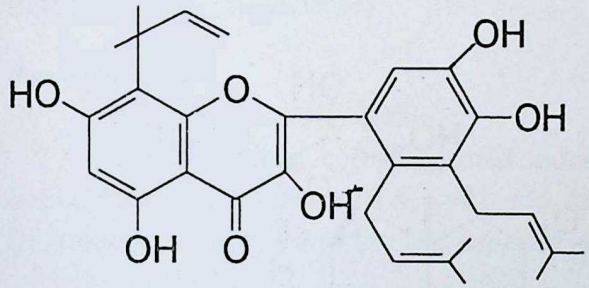
Distribution: Himalayas, from Kashmir to Kumaon and Arunachal Pradesh, alt. 2100-3300 m.

BROUSSONETIA (Moraceae)

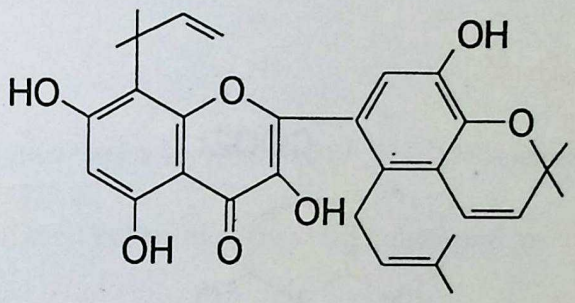
B. papyrifera (L.) Vent. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 119).

Structures of broussoflavonols C and D revised (*Heterocycles* 1989, *29,* 2379).

NEW COMPOUNDS



Broussoflavonol C



Broussoflavonol D

BRUCEA (Simaroubaceae)

B. amarissima (Lour.) Merr.; see *B. javanica* (L.) Merr.

B. javanica (L.) Merr. syn. *B. amarissima* (Lour.) Merr., *B. sumatrana* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 120).

Plant extract showed hypothermic effect (*Yakugaku Zasshi* 1990, *110,* 834; *Chem. Abstr.* 1991, *114,* 108759 r).

Absolute stereochemistry of bruceines D, E and H confirmed to be 1S, 5S, 7R, 8R, 9R, 10S, 11R, 12S, 13R, 14R, 15R with additional 2S for bruceine E (*J. Heterocycl. Chem.* 1989, *26,* 493; *Chem. Abstr.* 1990, *112,* 36212 r); absolute configuration of brusatol confirmed to be 5S, 7R, 8R, 9R, 10S, 11R, 12S, 13S, 14S, 15R (*J. Nat. Prod.* 1989, *52,* 740); a new alkaloid - 4-ethoxycarbonyl-2-quinolone - and a quassinoid - bruceine I - isolated from fruits and their structures elucidated; vanillic acid, quercetin-3-O-β-D-galactoside and luteolin-7-O-β-D-glucoside also isolated (*Yaoxue Xuebao* 1990, *25,* 382; *Chem. Abstr.* 1990, *113,* 227957 t); a new quassinoid - javanicin - isolated and its crystal structure determined (*Phytochemistry* 1990, *29,* 2720); isolation of bruceosides A and B and yadanzioside F (*Yakugaku Zasshi* 1990, *110,* 834; *Chem. Abstr.* 1991, *114,* 108759 r); total synthesis of (-)bruceantin (*J. Org. Chem.* 1990, *55,* 528); canthin-6-one, its N^3-oxide, and its 11-hydroxy-, 11-methoxy-, 5-methoxy-, 4-hydroxy-5-methoxy- and

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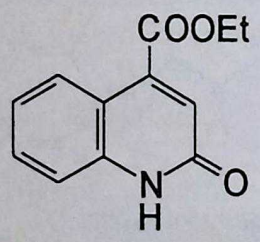
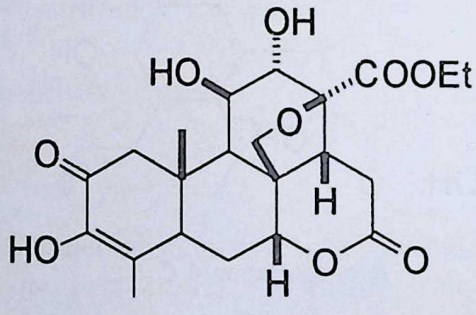
5,11-dimethoxy derivatives isolated from cell suspension culture (*Phytochemistry* 1990, *29,* 141; *J. Chin. Chem. Soc.* 1993, *40,* 403; *Chem. Abstr.* 1994, *120,* 101909 e); a HPLC method developed for isolation of bruceoside A from fruits (*J. Chromatogr.* 1991, *543,* 250; *Chem. Abstr.* 1991, *115,* 15691 t); a new cytotoxic quassinoid glucoside - bruceoside C - isolated and its structure determined; bruceoside A, bruceoside B, bruceine E, yadanziosides A, B, C, F, G and L also isolated (*J. Nat. Prod.* 1992, *55,* 468); synthesis of bruceantin (*J. Am. Chem. Soc.* 1993, *115,* 5841); absolute configuration of bruceine H determined by X-ray studies (*Heterocycles* 1994, *38,* 487); a new oxygenated monoterpene - 1-hydroxy-p-menth-4(8)-enolide - isolated and its structure elucidated; dillapiole (22.5), thymol (17.2) and α-thujone (8.4%) determined in leaf oil (*J. Essent. Oil. Res.* 1994, *6,* 145; *Chem. Abstr.* 1994, *121,* 65384 q).

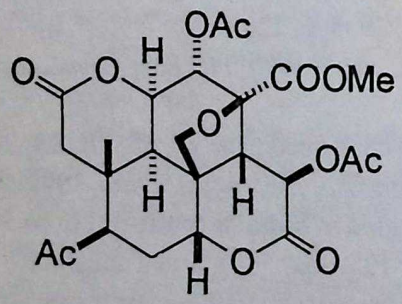
NEW COMPOUNDS



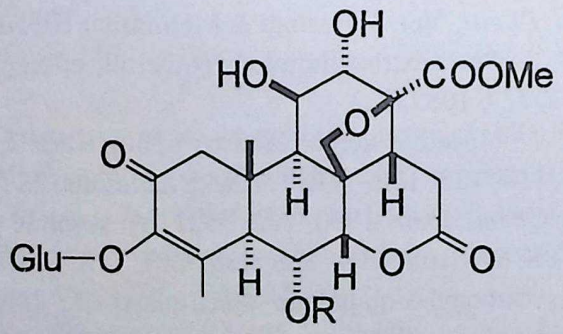
4-Ethoxycarbonyl-2-quinolone



Bruceine I



Javanicin



Bruceoside C
R = $COCH=CMe_2$

BIOLOGICAL ACTIVITY

Bruceoside C showed potent cytotoxicity against KB, A-549, RPMI and TE-671 tumor cells (*J. Nat. Prod.* 1992, *55,* 468).

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B. sumatrana Roxb.; see *B. javanica* (L.) Merr.

BRUGUIERA (Rhizophoraceae)

B. gymnorhiza (L.) Lamk. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 110).

Chemical studies of condensed tannin isolated from bark (*Phytochemistry* 1994, *35,* 217).

BRUNELLA (Lamiaceae)

B. vulgaris L.; see *Prunella vulgaris* L.

BRUNFELSIA (Solanaceae)

B. americana L.

Eng. - Lady of the night.

Ricinoleic acid, cyclopropenoid and normal fatty acids identified (*J. Am. Oil Chemists Soc.* 1991, *68,* 608; *Chem. Abstr.* 1991, *115,* 203339 h).

Distribution: Indigenous to tropical America and West Indies, intoduced into Indian gardens.

BRYOPHYLLUM (Crassulaceae)

B. calycinum Salisb.; see *B. pinnatum* (Lam.) Oken

B. pinnatum (Lam.) Oken syn. *Kalanchoe pinnata* Pers., *Bryophyllum calycinum* Salisb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 124).

A potent cytotoxic bufadienolide - bryophyllin B - isolated and its structure determined (*J. Nat. Prod.* 1989, *52,* 1071); isolation and structure elucidation of bryophyllol, bryophollone, bryophollenone, bryophynol and two homologous phenanthrene derivatives - 2(9-decenyl)phenanthrene (I) and 2(undecenyl)phenanthrene (II) from leaves; 18α-oleanane, ψ-taraxasterol, α- and β-amyrins and their acetates also isolated (*Phytochemistry* 1989, *28,* 2433); isolation and structure elucidation of 24-epiclerosterol [24(R)stigmasta-5, 25-dien-3β-ol], 24(R)5α-stigmasta-7, 25-dien-3β-ol, 5α-stigmast-24-en-3β-ol and 25-methyl-5α-ergost-24(28)-en-3β-ol from aerial parts (*Lipids* 1991, *26,* 660; *Chem. Abstr.* 1991, *115,* 275736 h); a potent cytotoxic compound - bersaldegenin-1,3,5-orthoacetate - isolated and its structure determined (*Shanghai Yike Daxue Xuebao* 1992, *19,* 206; *Chem. Abstr.* 1992, *117,* 188260 w); glutamic acid was major amino acid of the 16 amino acids detected in leaf protein hydrolysate; methionine, tyrosine and phenylalanine identified as three limiting acids (*Med. Sci. Res.* 1993, *21,* 507; *Chem. Abstr.* 1994, *120,* 4592 p).

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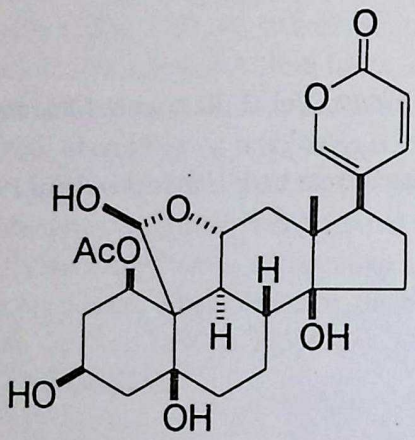
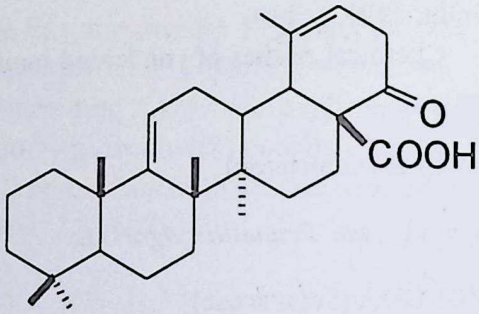
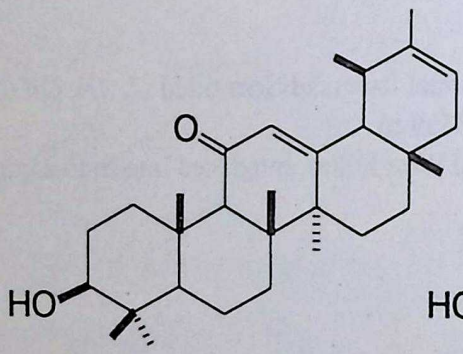


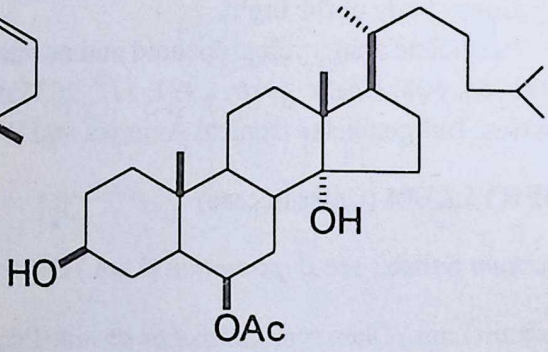
Bryophyllin B



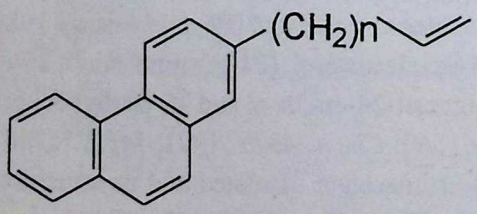
Bryophollone



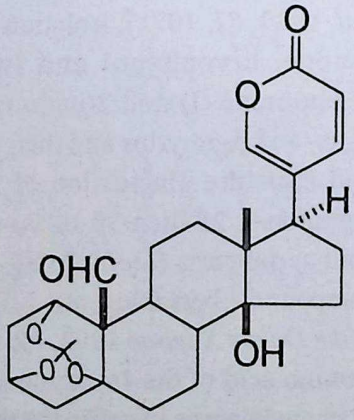
Bryophynol



Bryophyllol



I
n = 8
II
n = 9



Bersaldegenin-1,3,5-orthoacetate

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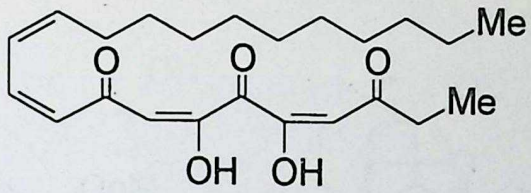

Bryophollenone

BIOLOGICAL ACTIVITY

Bersaldegenin-1,3,5-orthoacetate inhibited growth of several cancer cell lines (*Shanghai Yike Daxue Xuebao* 1992, *19,* 206; *Chem. Abstr.* 1992, *117,* 188260 w).

BUDDLEJA (BUDDLEIA) (Buddlejaceae)

B. asiatica Lour.; see *B. neemda* Ham. ex Roxb.

B. globosa Hope (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 125).

Two phenolic fatty acid esters - GS13A and GS13B - isolated from stem bark and identified as 2-(4-hydroxyphenyl)ethanol esters of lignoceric and docosanoic acids respectively; two other esters - GS14A and GS14B - isolated and identified as 4-hydroxycinnamoyl esters of lignoceric and docosanoic acids respectively (*Phytochemistry* 1989, *28,* 2693); verbascoside isolated from leaves (*J.Ethnopharmacol.* 1993, *39,* 221; *Chem. Abstr.* 1994, *120,* 212602 u).

BIOLOGICAL ACTIVITY

Antimicrobial minimal inhibitory concentration of verbascoside was found to be 1.0 mM (*J. Ethnopharmacol.* 1993, *39,* 221; *Chem. Abstr.* 1994, *120,* 212602 u).

B. neemda Ham.ex Roxb. syn. *B. asiatica* Lour. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 125).

Oil showed antifungal, antibacterial and anthelmintic activities *in vitro* (*Flavour Fragrance J.* 1992, *7,* 125; *Chem. Abstr.* 1992, *117,* 147192 g).

Octacosanol and apigenin-7, 4'-dimethylether isolated from whole plant (*J. Indian Chem. Soc.* 1990, *67,* 89); determination of β-caryophyllene oxide (21.7), citronellol (16.7) and β-caryophyllene (15.8%) in leaf oil (*Flavour Fragrance J.* 1992, *7,* 125; *Chem. Abstr.* 1992, *117,* 147192 g).

B. officinalis Maxim.

Eng. - Butterfly bush.

Two new triterpenoid glycosides - mimengosides A and B - isolated from flowers and buds and their structures determined; acteoside also isolated (*Chem. Pharm. Bull.* 1992, *40,* 780); a water-soluble, edible yellow pigment isolated from buds (*Tianran Chanwu Yanjiu Yu Kaifa* 1994, *6,* 21; *Chem. Abstr.* 1994, *121,* 297139 s).

Distribution : Introduced into Indian gardens.

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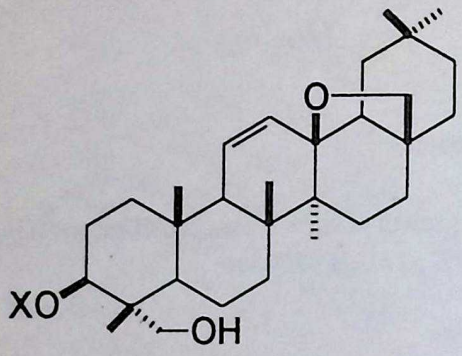
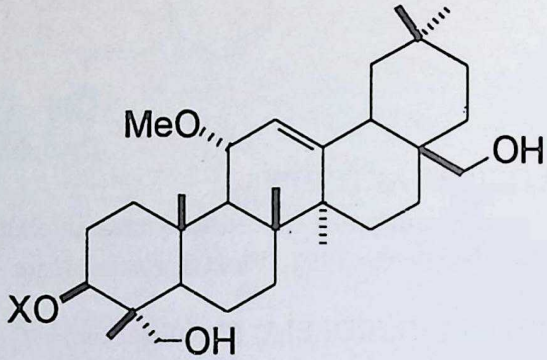
NEW COMPOUNDS





X = Fucose[(2→1)Glu](3→1)Glu(4→1)Rha

Mimengoside A Mimengoside B

BULBOPHYLLUM (Orchidaceae)

B. andersonii (Hook.f.) J.J. Schult. syn. *Cirrhopetalum andersonii* Hook. f.

A phenanthrene derivative - cirrhopetalin - isolated and characterised as 7-hydroxy-4-methoxy-2,3-methylenedioxyphenanthrene (*Phytochemistry* 1990, *29*, 1002); isolation of two bibenzyl derivatives - cirrhopetalidin and cirrhopetalinin and their structure elucidation; batatasin III (3,3'-dihydroxy-5-methoxybibenzyl) also isolated (*Phytochemistry* 1991, *30*, 321); cirrhopetalanthridin and cirrhopetalidinin isolated and their structures determined (*Phytochemistry* 1991, *30*, 3429).

Distribution: Sikkim Himalayas, alt. 2300 m.

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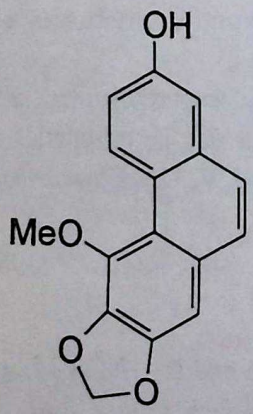
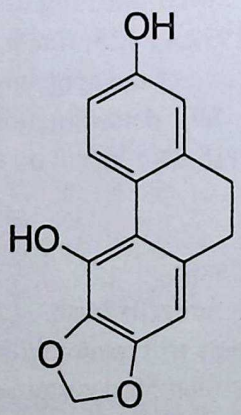


Cirrhopetalin



Cirrhopetalanthridin

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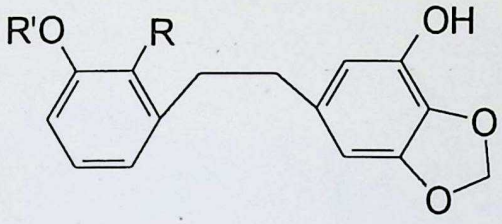
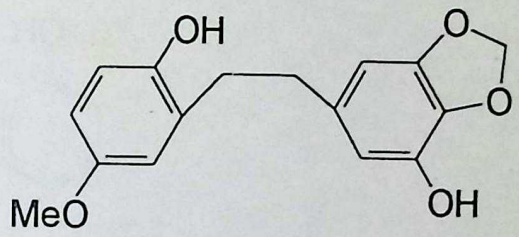




Cirrhopetalidin
R = OH, R' = Me
Cirrhopetalinin
R,R' = H

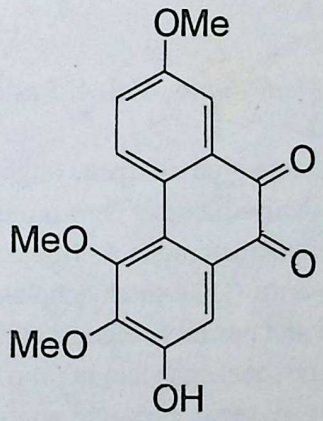
Cirrhopetalidinin

B. odoratissimum (Smith) Lindl.

A new phenanthraquinone - bulbophyllanthrone - isolated from orchid and its structure established; chrysin and pinobanksin also isolated (*Phytochemistry* 1991, *30*, 2092).

Distribution: Himalayas, from Nepal to Bhutan, Khasi Hills and Assam, alt. 1200-2300m.

NEW COMPOUNDS



Bulbophyllanthrone

B. umbellatum Lindl. syn. *Cirrhopetalum maculosum* Lindl.

Isolation and structure determination of a new dimeric phenanthrene derivative - cirrhopetalanthrin - from orchid (*Phytochemistry* 1990, *29*, 271).

Distribution : Himalayas, from Garhwal to Bhutan, alt. 300-1200 m.

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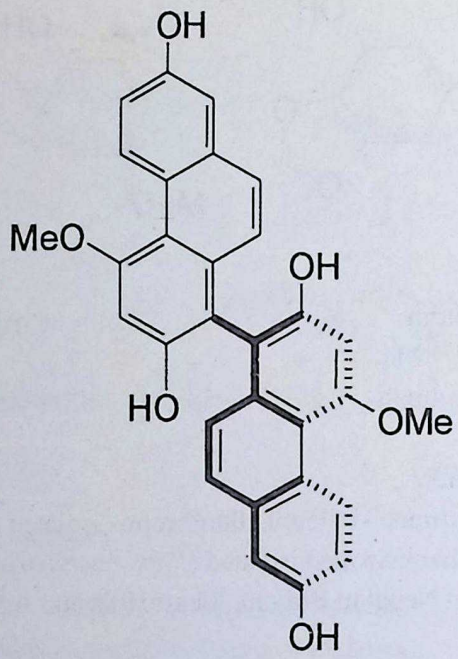

Cirrhopetalanthrin

BUPLEURUM (Apiaceae)

B. falcatum L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 126).

Two new malonylated oleanane-type triterpene oligoglycosides - malonylsaikosaponins a and d - isolated from roots and their structures determined (*Chem. Pharm. Bull.* 1990, *38*, 1432); isolation of a new chromone - saikochromone A - from roots and its structure determination; saikogenin D, saikogenin F, saikogenin G, 24-methylcholesta-7,22E-dien-3β,5α,6β-triol, 24-ethylcholest-22E-en-3β,5α,6β-triol and nortrachelogenin (*Chem. Pharm. Bull.* 1990, *38*, 3169); saikosaponins a, c and d present in root, leaf and stem in ratio of 2.6:2.0:1.0; distribution of these saponins in Taiwan plant and their seasonal variation analysed by HPLC (*Zhonghua Yaoxue Zazhi* 1991, *43*, 385; *Chem. Abstr.* 1992, *116*, 11090 u; Jpn. 3,151,003 (1991) Jan. 27; *Chem. Abstr.* 1991, *115*, 142243 y); three new polyacetylenes - saikodiynes A, B and C - isolated from roots and their structures elucidated; 2Z,9Z-pentadecadien-4,5-diyn-1-ol also isolated (*Phytochemistry* 1991, *30*, 1543); pectic polysaccharide isolated from roots and partially characterised (*Carbohydr. Res.* 1991, *219*, 173; *Chem. Abstr.* 1992, *116*, 80462 d); process developed for extraction of saikosaponins b1and b2 from roots (Jpn. 3,255,030 (1991) Nov. 13; *Chem. Abstr.* 1992, *116*, 91365 a); three acetyl saponins (I, II and III) isolated from roots (Jpn. 4,159,293 (1992) Jun. 02; *Chem. Abstr.* 1993, *118*, 27446 s); process developed for isolation of acetylsaikosaponin 1 (Jpn. 4,159,294 (1992) Jun. 02; *Chem. Abstr.* 1993, *118*, 45727 b).

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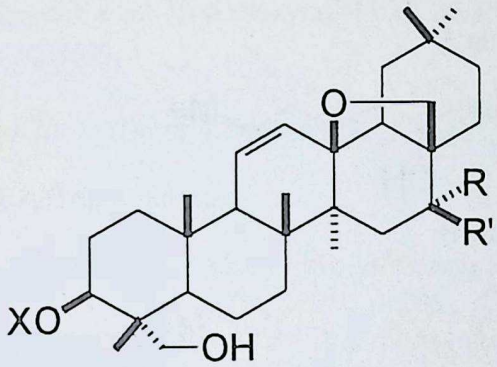
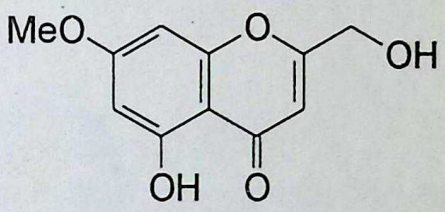
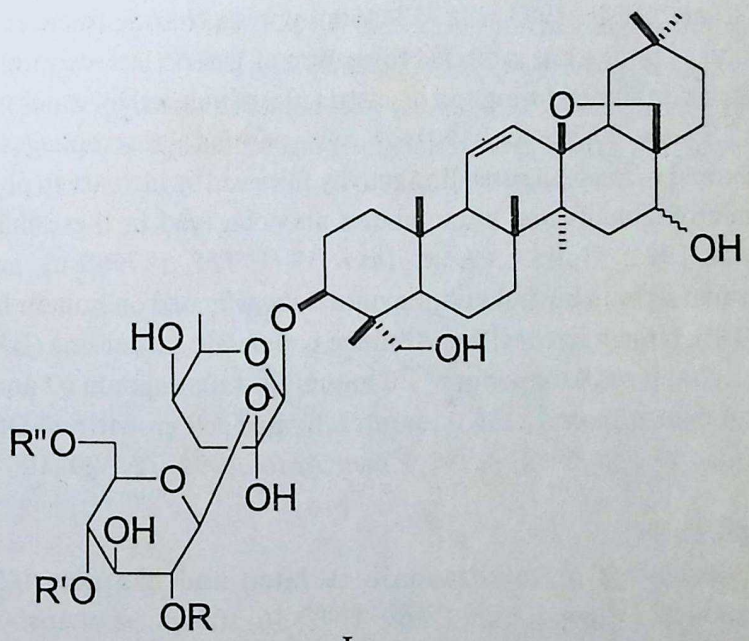


X = Fuc(3→1)Glu(6-malonyl)
Malonylsaikosaponin a
R = H, R' = OH
Malonylsaikosaponin b
R = OH, R' = H



Saikochromone A



I
R,R'' = H, R' = Ac, ~~~ = α
II
R,R'' = Ac, R' = H, ~~~ = α
III
R,R'' = Ac, R' = H, ~~~ = β

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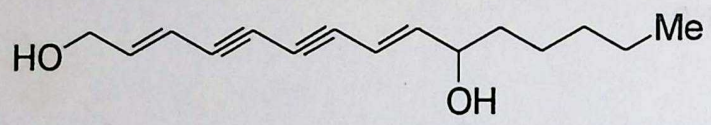
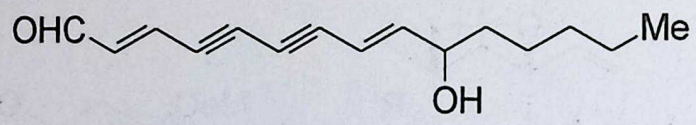
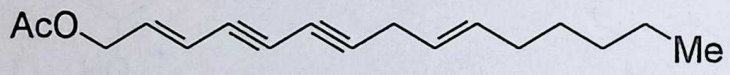


Saikodiyne A



Saikodiyne B



Saikodiyne C

BIOLOGICAL ACTIVITY

Acetyl and succinoyl derivatives of saikosaponin I had IC50 of 0.53 mM and 13.0 μM respectively against Na^+-K^+ ATPase (Jpn. 4,159,294 (1990) Jun. 02; *Chem. Abstr.* 1993, *118*, 45727 p; Jpn. 240,395 (1990) Feb. 09; *Chem.* Abstr. 1990, *113*, 46311 g); three acetyl saponins (I,II and III) found to be useful for treatment of heart failure and atrial arrhythmia (Jpn. 4,159,293 (1992) Jun. 02; *Chem. Abstr.* 1993, *118*, 27446 s); polysaccharide fraction, BR-2, at doses of 0.05 to 0.2 kg (oral, i.p. or s.c.), inhibited formation of gastric lesions induced by necrotising agents in mice. It also inhibited formation of gastric ulcers induced by water immersion stress or pylorus ligation (*J. Pharm. Pharmacol.* 1991, *43*, 699); peritoneal macrophages from saikosaponin D-treated mice showed increase in spreading activity followed by increase in phagocytosis. Intense distribution of microfilaments and microtubules also observed in these macrophages (*Int. J. Immunopharmacol.* 1991, *13*, 493; *Chem. Abstr.* 1991, *115*, 197968 u); antitumor effects of saikosaponin a, saikosaponin b2 and saikosaponin d investigated on human hepatoma cell lines (PLC/PRF, Hep-G2), human liver cells and human pancreatic cancer line (BXPC-3). IC50 were found to be 50.0 μg/ml for saikosaponin a, 1.0 mg/ml for saikosaponin b2 and c and 20.0 μg/ml for saikosaponin d. Saikosaponin a (50.0 μg/ml) inhibited cell growth and DNA synthesis of all cell lines tested (*Cancer Lett.* 1994, *86*, 91; *Chem. Abstr.* 1994, *121*, 292196 y).

B. longicaule Wall. ex DC.

A new derivative of saikosaponin isolated and characterised as 2"-O-β-D-glucosylsaikosaponin b2 (*Magn. Reson. Chem.* 1992, *30*, 1097; *Chem. Abstr.* 1993, *118*, 56170 c).

Distribution: Himalayas, from Kashmir to Sikkim, alt. 2400-3900 m.

BURSERA (Burseraceae)

B. delpechiana Boiss. ex Engl. syn. *B. penicillata* (Sesse & Moc. ex DC.) Engl. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 111).

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Two new triterpenoids - 11-oxoursolic acid and 11-oxoacetylursolic acid - isolated from resin as their methyl esters designated as BDGM-1 and BDGM-7; ursonic acid, ursolic acid, acetylursolic acid, 3β-acetoxyurs-11-en-28,13-olide and α-amyrin also isolated (*Phytochemistry* 1991, *30*, 362).

B. penicillata (Sesse & Moc. ex DC.) Engl.; see *B. delpechiana* Boiss. ex Engl.

BUTEA (Papilionaceae)

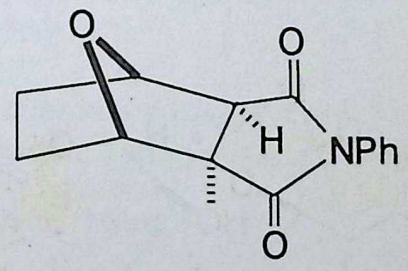
B. frondosa Koen. ex Roxb.; see *B. monosperma* (Lam.) Taub.

B. monosperma (Lam.) Taub. syn. *B. frondosa* Koen. ex Roxb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 128).

Alcoholic extract of flower at low doses whereas ether and water extracts at higher doses showed anti-estrogenic activity in immature mice; ethyl acetate extract containing butrine and isobutrine exhibited poor activity. Significant inhibition of uterus weight gain and vaginal epithelium cornification also observed (*Indian J. Pharm. Sci.* 1990, *52*, 272).

A new imide - palasimide - isolated from pods and characterised as palasonin-N-phenylimide (*Phytochemistry* 1990, *29*, 2017); butrin, isobutrin and free aminoacids present in flowers (*Indian J. Pharm. Sci.* 1990, *52*, 272); isolation of 15-hydroxypentacosanoic acid and 1-carbomethoxy-2-carbamylhydrazine from seed coat (*Indian J. Chem.* 1991, *30*B, 715); glucose, fructose, histidine, aspartic acid, alanine and phenylalanine isolated from flowers (*Indian Drugs* 1992, *29*, 422).

NEW COMPOUNDS



Palasimide

CADABA (Capparaceae)

C. farinosa Forsk.; see *C. fruticosa* (L.) Druce

C. fruticosa (L) Druce syn. *C. farinosa* Forsk., *C. indica* Lamk. (*Compend. Indian Med Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 128).

A new eudesmanolide - cadabicilone - isolated and its structure determined by 2D-NMR (*Z. Naturforsch.* 1990, *45*B, 1100; *Chem. Abstr.* 1991, *114*, 203479 h).

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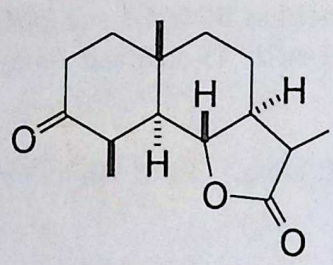


Cadabicilone

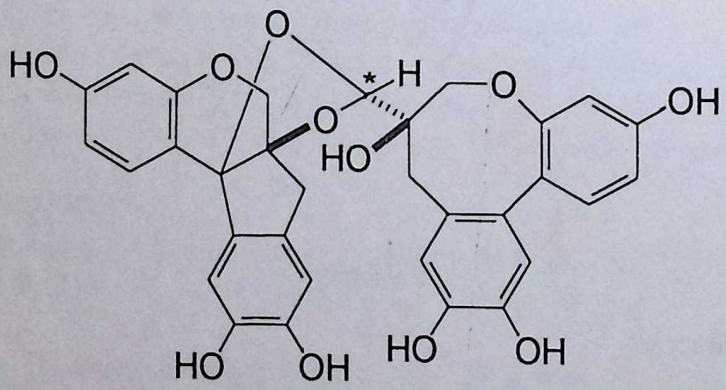
C. indica Lamk.; see *C. fruticosa* (L.) Druce

CAESALPINIA (Caesalpiniaceae)

C. sappan L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 130).

An inseparable mixture of two new dibenz[b,d]oxocins - protosappanins E-1 and E-2 - isolated from heartwood, chemical studies revealed that both protosappanins consist of protosappanin C combined with 11b-hydroxybrazilin through acetal linkage and are stereoisomeric in respect of acetal carbon (*Chem. Pharm. Bull.* 1990, *38*, 1490); caesalpin P, sappanchalcone, 3-deoxysappanone, protosappanin A, brazilin and two aromatic compounds (I and II) isolated as active ingredients from wood (Jpn. 2,264,718 (1990) Oct. 29; *Chem. Abstr.* 1991, *114*, 235041 a); isolation of n-triacontane, lupeol, β-amyrin, β-sitosterol and stigmasterol from unsaponifiable matter (1.12%) of seed fixed oil (*Asian J. Chem.* 1993, *5*, 676; *Chem. Abstr.* 1993, *119*, 135658 s).

NEW COMPOUNDS



Protosappanin E-1
* = S
Protosappanin E-2
* = R

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BIOLOGICAL ACTIVITY

Sappanchalcone (10.0 μM) inhibited aldose reductase (83.9%) (Jpn. 2,264,718 (1990) Oct. 29; *Chem. Abstr.* 1991, *114*, 235041 a).

CAESULIA (Asteraceae)

C. axillaris Roxb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 132).

A new compound isolated from leaf oil and characterised as (E)2-methoxy-2,5-methylenedioxycinnamyl alcohol; in addition, γ-asarone (63.09%) and limonene (30.85%) isolated (*J. Essent. Oil Res.* 1993, *5*, 139; *Chem. Abstr.* 1993, *119*, 156275 e).

CAJANUS (Papilionaceae)

C. cajan (L.) Millsp. syn. *C. indicus* Spreng. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi 1995, p. 132).

24-Epiclerosterol, 24α- and 24β-methyl-5α-cholest-8(14)-en-3β-ols, 24α-ethyl-5α-cholest-8(14)-en-3β-ol, 14α,24α- and 14α,24β-dimethyl-5α-cholest-9(11)-en-3β-ols, 14α-methyl-24α-ethyl-5α-cholest-9(11)-en-3β-ol, 14α-methyl-24β-ethyl-5α-cholesta-9(11),25-dien-3β-ol and β-sitosterol identified in seeds (*Phytochemistry* 1992, *31*, 1765); acoradiene, β-selinene, α- and β-guaienes, α-himachalene, benzyl benzoate and eremophilene identified in leaf essential oil (*Fenzi Ceshi Tongbao* 1992, *11*, 9; *Chem. Abstr.* 1993, *119*, 177612 c); linoleic (54.8), palmitic (21.4), caprylic, lauric, oleic, and eicosenoic acids determined in oil (*Int. J. Food. Sci. Nutr.* 1993, *43*, 187; *Chem. Abstr.* 1993, *119*, 137935 d); a phytotoxic compound - 3-hydroxy-5-methoxystilbene-2-carboxylic acid - isolated from leaves (*Soil Sci. Plant Nutr. Tokyo* 1993, *39*, 55; *Chem. Abstr.* 1993, *119*, 135604 w).

BIOLOGICAL ACTIVITY

3-Hydroxy-5-methoxystilbene-2-carboxylic acid (0.5 mM/L) inhibited (80%) lettuce radicle elongation (*Soil Sci. Plant Nutr. Tokyo* 1993, *39*, 55; *Chem. Abstr.* 1993, *119*, 135604 w).

C. indicus Spreng.; see *C. cajan* (L.) Millsp.

CALAMINTHA (Lamiaceae)

C. clinopodium Benth.; see *Clinopodium vulgare* L.

C. umbrosa (Bieb.) Benth.; see *Clinopodium umbrosum* (Bieb.) Koch.

CALENDULA (Asteraceae)

C. arvensis L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 132).

Saponin fraction from aerial parts exhibited haemolytic activity *in vitro* and anti-inflammatory activity against carrageenin-induced paw oedema in rats. These activities as well

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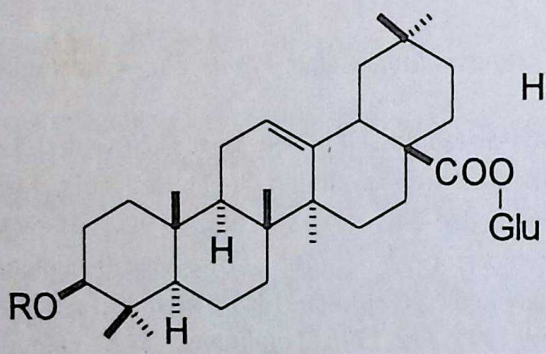
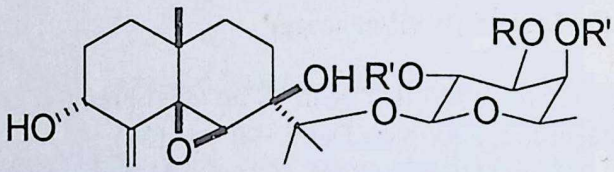
as acute i.p. toxicity in mice were higher in fresh plant extract than in dried plant extract presumably due to higher saponin content in the former; arvenoside B identified as component responsible for haemolytic activity (*J. Pharm. Belg.* 1990, *45*, 12; *Chem. Abstr.* 1990, *112*, 210954 w).

2D NMR assignments of arvenosides A and B (*Spectrosc. Lett.* 1989, *22*, 579; *Chem. Abstr.* 1990, *112*, 3333 v); four triterpenoid saponins (I, II, III and IV) reported earlier (*J. Nat. Prod.* 1987, *50*, 927); and another oleanolic acid glycoside (V) isolated from aerial parts and characterised (*Planta Med.* 1991, *57*, 250); four new eudesmane fucopyranosides (VI, VII, VIII and IX) isolated and their structures established by high field NMR spectroscopy; in addition, α-bisabolone and its β-D-fucopyranoside isolated (*J. Nat. Prod.* 1993, *56*, 1821).

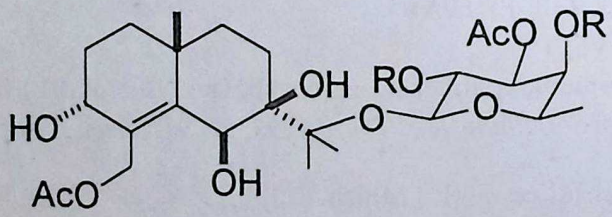
NEW COMPOUNDS



V
R = Glu[(3→1)Gal](4→1)Glu



VI
R = Ac, R' = Angeloyl
VII
R = $COCHMe_2$, R' = Angeloyl
VIII
R = $COCH(Me)CH_2Me$, R' = Angeloyl



IX
R = Angeloyl

BIOLOGICAL ACTIVITY

All saponins (I-V) inhibited VSV multiplication while HRV replication was significantly affected by saponin III only (*Planta Med.* 1991, *57*, 250).

C. officinalis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 134).

2D-NMR assignments of calendulosides C and D (*Spectrosc. Lett.* 1989, *22*, 579; *Chem. Abstr.* 1990, *112*, 33333 v); three homogeneous polysaccharides, having (1→3)-linked β-D-

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galactan backbone with branching points at C-6 and side-chain comprising short α-arabinofuranosyl(1→3)-arbinofuranosyl and α-L-rhamnopyranosyl(1→3)-arbinofuranosyl units, isolated from flowers (*Phytochemistry* 1989, *28,* 2379); a new triglycoside isolated from flowers and characterised as isorhamnetin-3-O-α-L-rhamnosyl(1→2)-O-[α-L-rhamnosyl(1→6)]-β-D-glucoside; in addition, isorhamnetin-3-O-β-D-glucoside and isorhamnetin-3-O-α-L-rhamnosyl-(1→6)-O-β-D-glucoside isolated (*Chem. Pap.* 1991, *45,* 105; *Chem. Abstr.* 1991, *115,* 46034 k); essential oil (0.3%) from flowers consisted mainly of α-cadinol (25.0%) as determined by GC-MS (*Flavour Fragrance J.* 1991, *6,* 1989; *Chem. Abstr.* 1992, *116,* 135980 d).

BIOLOGICAL ACTIVITY

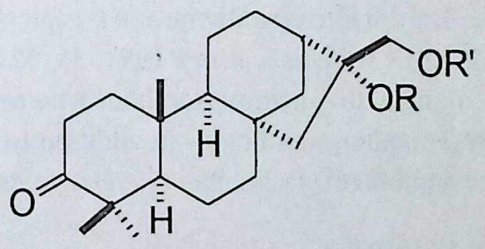
Polysaccharides from flowers exhibited immuno-stimulating activity in several *in vitro* test systems (*Phytochemistry* 1989, *28,* 2379).

CALLICARPA (Verbenaceae)

C. macrophylla Vahl (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 135).

A new diterpenoid - isopropylidenocalliterpenone - isolated from essential oil of leaves along with calliterpenone and its monoacetate and characterised as 16α,17-isopropylideno-3-oxo-phyllocladane (*Phytochemistry* 1994, *37,* 587).

NEW COMPOUNDS



Calliterpenone
R,R' = H
Isopropylidenocalliterpenone
RR' = -CMe_2-

CALLISTEMON (Myrtaceae)

C. polandii F.M. Bailey

1,8-Cineole (31.9), myrcene (14.69), methyl cinnamate (13.03), humulene (8.30) and β-caryophyllene (3.82%) determined in leaf oil by GC (*Indian Perfum.* 1990, *34,* 123; *Chem. Abstr.* 1991, *114,* 108684 n).

Distribution: Native of Australia, introduced at National Botanical Research Institute, Lucknow.

C. rigidus R.Br. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 135).

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1,8-Cineole (89.9%) determined in leaf essential oil (*J. Essent. Oil Res.* 1991, *3*, 465; *Chem. Abstr.* 1992, *116*, 27912 z).

CALONYCTION (Convolvulaceae)

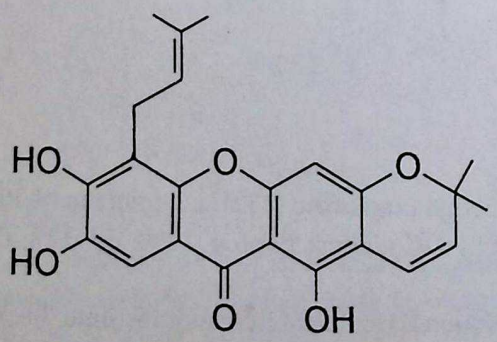
C. aculeatum (L.) House; see *Ipomoea alba* L.

CALOPHYLUM (Clusiaceae)

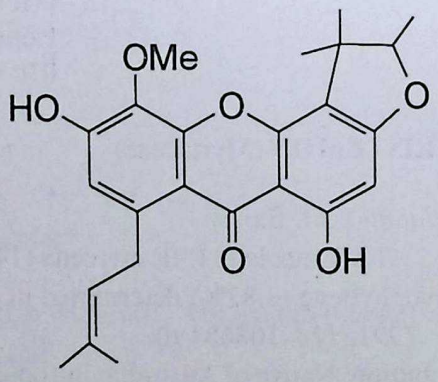
C. elatum Bedd.; see *C. polyanthum* Wall. ex Choisy

C. inophyllum L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 117).

A new xanthone isolated from heartwood and its structure determined as 2-(3-hydroxy-3-methylbutyl)-1,3,5,6-tetrahydroxyxanthone; in addition, jacareubin, its 6-deoxy derivative, 2-(3-methylbut-2-enyl)-1,3,5,6-tetrahydroxyxanthone and 2-(3-methylbut-2-enyl)-1,3,5-trihydroxyxanthone isolated (*Phytochemistry* 1991, *30,* 366); new compounds - inophyllums P, G-1 and G-2 and an enantiomer of soulattrolide (I) - isolated from Malaysian tree and characterised; inophyllums A, B, C and E also isolated; absolute stereochemistry of inophyllum A confirmed by X-ray analysis and relative stereochemistry of other inophyllums thus determined (*J. Med. Chem.* 1993, *36,* 4131); two new xanthones - caloxanthones A and B - isolated from root bark along with macluraxanthone, 1,5-dihydroxyxanthone and (-) epicatechin and structures of new compounds elucidated by 2D NMR (*Phytochemistry* 1994, *35,* 527); root bark afforded a new xanthone - caloxanthone C - along with 4-hydroxyxanthone whereas heartwood of root afforded a new xanthone - 1-hydroxy-2-methoxyxanthone - in addition to 1,2-dimethoxyxanthone, 2-hydroxy-1-methoxyxanthone and 6-deoxyjacareubin (*Heterocycles* 1994, *37,* 833).
NEW COMPOUNDS



Caloxanthone A



Caloxanthone B

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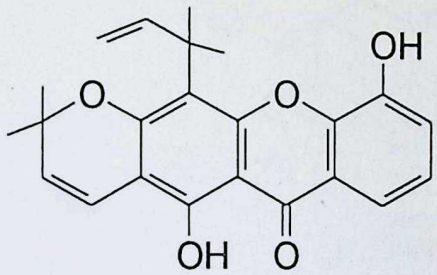
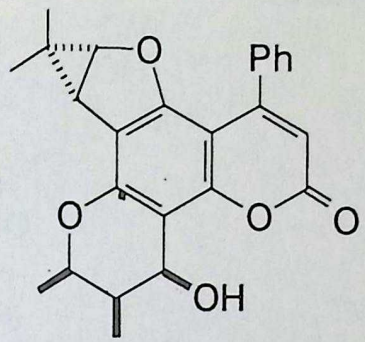
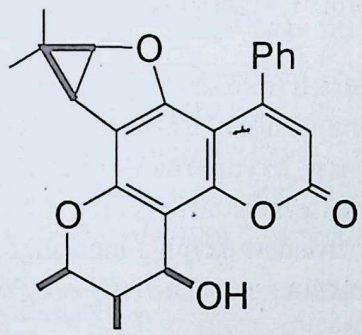


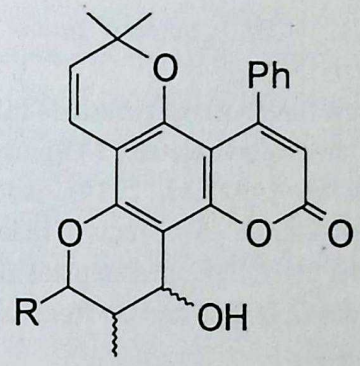
Caloxanthone C



Inophyllum G-1



Inophyllum G-2



Inophyllum P
R = β-Me, ~~ = α
I
R = α-Me, ~~ = β

BIOLOGICAL ACTIVITY

Inophyllums B and P inhibited HIV reverse transcriptase (IC50 38 and 130 nM respectively) and were active against HIV-1 in cell culture (IC50 1.4 and 1.6 μM respectively). Inophyllums A, C, D and E were less active (*J. Med. Chem.* 1993, *36,* 4131).

C. polyanthum Wall. ex Choisy syn. *C. elatum* Bedd., *C. tomentosum* auct.(non Wight) (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 118).

A new xanthonoid - tomentonone - isolated from bark and characterised; zeyloxanthonone (wightianone), calozeyloxanthone, 2-hydroxyxanthone, 3-hydroxyxanthone, euxanthone, 1,5-dihydroxyxanthone and 1,3,5-trihydroxy-2-methoxyxanthone also isolated (*J. Nat. Prod.* 1994, *57,* 396); a new compound from leaves characterised as 9-hydroxy-2,2,6,7-tetramethyl-2H[1]-benzopyran-(1-phenylethylene-10-yl)-[3,2-b]-dihydropyran-4-one (*Phytochemistry* 1994, *35,* 507).

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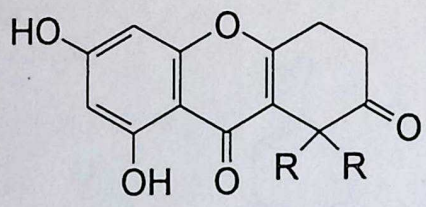
NEW COMPOUND



Tomentonone
R = $CH_2CH{=}CMe_2$

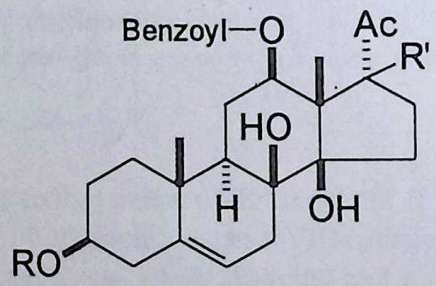
C. tomentosum Wight; see *C. polyanthum* Wall. ex Choisy

CALOTROPIS (Asclepiadaceae)

C. gigantea (L.) R.Br. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 136).

A new flavonol trisaccharide - calotropiside - isolated from aerial parts and its structure determined; taraxasteryl acetate, 3-O-glucoside and 3-O-rutinoside of isorhamnetin also isolated (*Phytochemistry* 1992, *31,* 2919); isolation of two new oxypregnane oligoglycosides - calotroposides A and B - from roots of Indonesian plant and their characterisation (*Chem. Pharm. Bull.* 1992, *40,* 2007); Indonesian plant afforded another five new oxypregnane oligoglycosides - calotroposides C, D, E, F and G - from roots and their structures elucidated (*Chem. Pharm. Bull.* 1992, *40,* 2647).

NEW COMPOUNDS



Calotroposide A
R = X-(4→1)Oleandrose(4→1)Cymarose, R' = H
Calotroposide B
R = X-(4→1)Oleandrose(4→1)Cymarose, R' = OH
Calotroposide C
R = X-(4→1)Oleandrose(4→1)Oleandrose, R' = OH
Calotroposide D
R = X-(4→1)Oleandrose(4→1)Oleandrose, R' = H
Calotroposide E
R = X-(4→1)Oleandrose, R' = OH
Calotroposide F
R = X-(4→1)Oleandrose, R' = H
Calotroposide G
R = X, R' = H
X = Cymarose(4→1)Cymarose(4→1)Oleandrose

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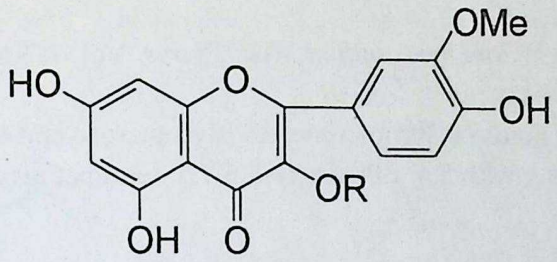
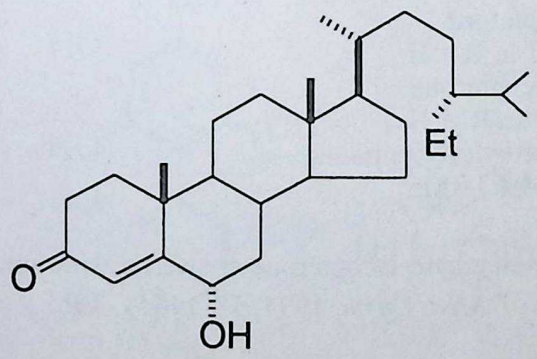


Calotropiside
R = Glu(2→1)Gal(6→1)Rha

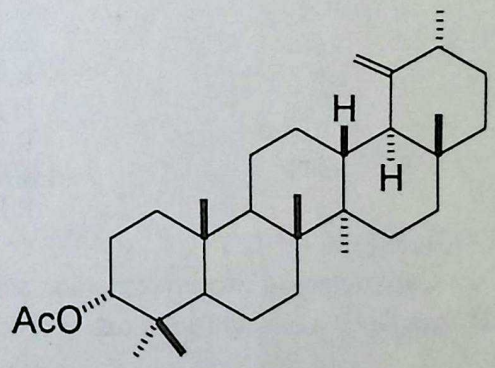
C. procera (Ait.) R.Br. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 137).

A new steroidal hydroxyketone - procesterol - isolated from fresh flowers and characterised as C-6 and C-24 diepimer of stigmast-4-en-6β-ol-3-one (*Phytochemistry* 1989, *28,* 2859); isolation of a new triterpene from latex and its characterisation as taraxast-20(30)-en-3-(4-methyl-3-pentenoate); in addition, taraxasteryl acetate isolated (*Curr. Sci.* 1989, *58,* 1093); multiflorenol, cyclosadol, cycloart-23-en-3β,25-diol, β-sitost-4-en-3-one, α- and β-amyrins, stigmasterol and β-sitosterol identified in flowers (*Fitoterapia* 1990, *61,* 89); isolation of a C18-isoursane derivative (I) from root bark and assignment of its structure (*Tetrahedron Lett.* 1992, *33,* 7593).

NEW COMPOUNDS.



Procesterol



I

CALTHA (Ranunculaceae)

C. palustris L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 138).

3-Glucoside, 7-rhamnoside and 3-gluco-7-rhamnoside derivatives of kaempferol and quercetin isolated from flowers; in addition, two partially characterised kaempferol and quercetin glycosides isolated (*Herba Pol.* 1991, *37,* 125; *Chem. Abstr.* 1993, *118,* 56114 n); an immuno-active polysaccharide isolated and its immuno-modulatory effect determined (*Herba Pol.* 1993, *39,* 103; *Chem. Abstr.* 1994, *121,* 26483 b).

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CALYCOPTERIS (Combretaceae)

C. floribunda (Roxb.) Poir. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 126).

Three new biflavonoids - calycopterone, isocalycopterone and 4-demethylcalycopterone - isolated from flowers along with 5,4'-dihydroxy-3,6,7,3'-tetramethoxyflavone (*J. Med. Chem.* 1994, *37,* 1465).

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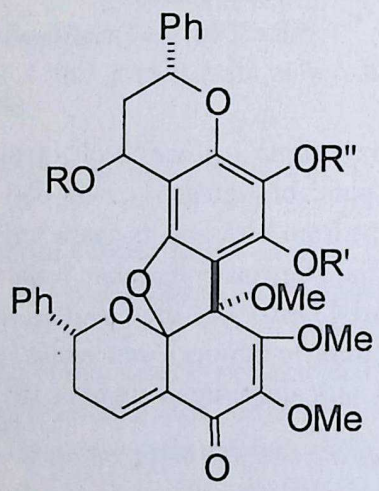

Calycopterone
R,R" = Me, R' = H
Isocalycopterone
R,R' = Me, R" = H
4'-Demethylcalycopterone
R,R' = H, R" = Me

BIOLOGICAL ACTIVITY

Calycopterone, isocalycopterone and 4-demethylcalycopterone showed a wide range of activity against a panel of solid tumor cell lines (*J. Med. Chem.* 1994, *37,* 1464).

CAMELLIA (Theaceae)

C. japonica L.

Eng. - Garden camellia, Japanese rose.

Two new tannins - camelliatannins A and B - isolated from leaves and their structures elucidated; gemin D, casuariin, pedunculagin and 2,3-(S)-hexahydroxydiphenoxyglucose also isolated (*Chem. Pharm. Bull.* 1991, *39,* 876).

Distribution: Native of Japan, introduced into Indian gardens in hilly regions.

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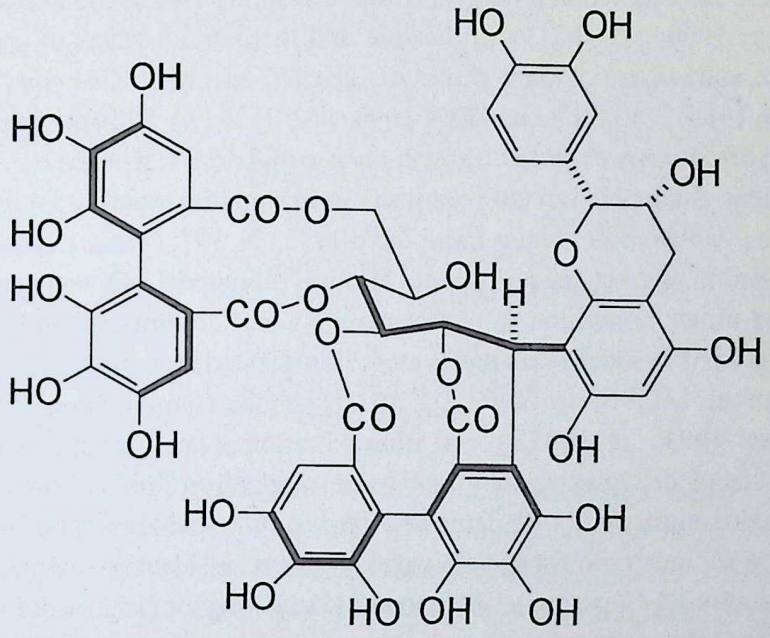
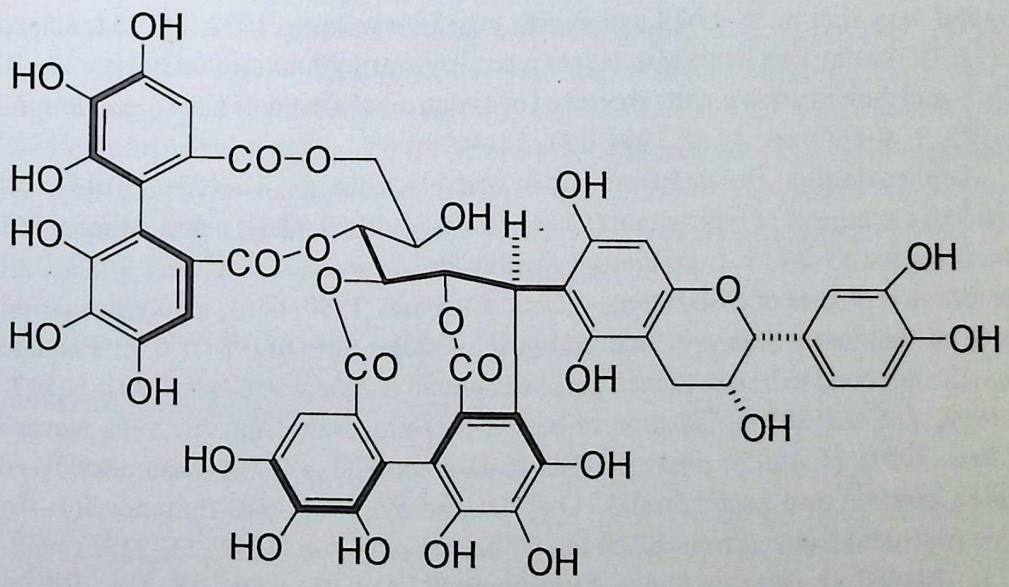


Camelliatannin A



Camelliatannin B

C. sinensis (L.) Kuntze syn. *C. sinensis* (L.) Kuntze var. *assamica* (Mast.) Kitamura, *C. theifera* Griff., *Thea sinensis* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 139).

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Chinese green tea extract inhibited mutagenicity of benzo[a]pyrene and aflatoxin B1 and suppressed activity of benzo[a]pyrene hydroxylase. It also inhibited cumene hydroperoxide and CCl_4-induced lipid peroxidation in rat liver microsomes (*Weisheng Dulixue Zazhi* 1988, *2,* 10; *Chem. Abstr.* 1990, *112,* 97139 u); hexane and methanol extracts of green and black tea showed less but marked antioxidant activity (*Agric. Food Chem. Consum., Proc. Eur. Conf. Food Chem.* 5th 1989, *2,* 433; *Chem. Abstr.* 1990, *112,* 75561 y); Chinese green tea polyphenols (CTP) inhibited *Streptococcus mutans* growth *in vitro* and drug resistance was not observed after repeated treatment. Studies in human volunteers indicated that mouth washing with 0.2% CTP prevented caries (*Zhonghua Kouqiang Yixue Zazhi* 1993, *28,* 197; *Chem Abstr.* 1994, *120,* 315791 j); topical application of green tea polyphenol fraction inhibited 12-O-tetradecanoylphorbol-13-acetate- induced tumor promotion in mouse skin. Its oral administration inhibited UV light-induced tumorigenesis in mouse skin and tumors from treated animals were smaller than tumors from control animals (*ACS Symp. Ser.* 1992, *507,* (Phenolic Compd. Food Their Eff. Health II), 284; *Chem. Abstr.* 1993, *118,* 5985 q); oral administration of green tea infusion (12.5 g leaves/l) as the sole source of drinking water to A/J mice markedly inhibited N-nitrosodiethylamine (NDEA)-induced tumorigenesis. It decreased lung tumor incidence and forestomach tumor multiplicity. Oral administration of decaffeinated green tea and black tea extracts (0.6%) inhibited 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone-induced lung tumorigenesis in A/J mice by 65%. Inhibition appeared primarily to be due to its major polyphenol, (-) epigallocatechin gallate (*ACS Symp. Ser.* 1992, *507* (Phenolic Compd. Food Their Eff. Health II), 300; *Chem. Abstr.* 1993, *118,* 5987 s); anticoagulant and antithrombotic properties of green tea polysaccharides demonstrated *in vitro* and *in vivo* in mice, rabbit and guinea pig (*Zhongcaoyao* 1992, *23,* 254; *Chem. Abstr.* 1993, *117,* 103881 b); incidence of ischemia reperfusion arrhythmias in rat heart was reduced by about 70% and duration was greatly shortened by action of tea flavanols (*Zhongguo Bingli Shengli Zazhi* 1993, *9,* 401; *Chem. Abstr.* 1994, *121,* 221467 b).

Diphenylamine isolated from green and black tea (*J. Nat. Prod.* 1984, *47,* 775); stereoselective synthesis of typhasterol (*Chem. Commun.* 1989, 612); a new compound isolated and characterised as 2-O-β-L-arabinosyl-myoinositol (*Agric. Biol. Chem.* 1989, *53,* 2975); stereoselective synthesis of castasterone (*Chem. Commun.* 1990, 650); a polysaccharide (TSA) consisting of rhamnose, arabinose and galactose in molar ratio of 0.54:1.0:0.94 isolated from fresh leaves and found to be a branched galactoarabinan (*Chinese J. Chem.* 1991, *9,* 547; *Chem. Abstr.* 1992, *116,* 231881 t); isolation of benzyl-β-D-glucoside from fresh tea leaves (*Agric. Biol. Chem.* 1991, *55,* 1205); quercetin-3-O-[β-D-glucosyl(1→3)-α-L-rhamnosyl(1→6)-β-D-glucoside (0.095%) and kaempferol-3- O-[β-D-glucosyl(1→3)-α-L-rhamnosyl(1→6)]-β-D-glucoside (0.012%) isolated from black tea (*J. Sci. Food Agric.* 1991, *55,* 313; *Chem. Abstr.* 1991, *115,* 181863 y); two new flavonol triglycosides - camelliasides A and B - isolated from seeds and characterised (*Phytochemistry* 1991, *30,* 991); schaftoside, isoschaftoside, orientin, isoorientin, vitexin, isovitexin and vicenin 2 identified by HPLC (*Z. Lebensm.-Unters. Forsch.* 1993, *197,* 239; *Chem. Abstr.* 1994, *120,* 132504 y); another new flavonol glycoside - camelliaside C - from seed cake and its structure determination (*Chem. Pharm. Bull.* 1993, *41,* 1185).

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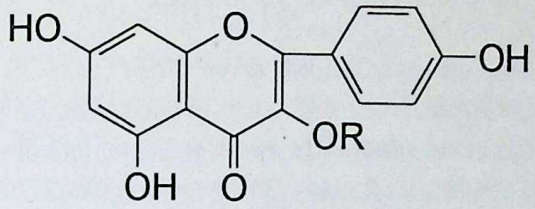

Camelliaside A
R = Glu[(2→1)Gal](6→1)Rha
Camelliaside B
R = Glu[(2→1)Xyl](6→1)Rha
Camelliaside C
R = Glu(2→1)Gal

BIOLOGICAL ACTIVITY

Diphenylamine (10.0 mg/kg, p.o.) administered to rabbits caused after 2 hr 61.4% reduction in blood sugar whereas tolbutamide (50.0 mg/kg) caused 44.1% reduction (*J. Nat. Prod.* 1984, *47,* 775); crude catechins, catechin gallates and all theaflavin fractions at concentrations of 100 - 300 ppm inhibited growth of both spores and vegetative cells of *Clostridium botulinum* (*Nippon Shokuhin Kogyo Gakkaishi* 1989, *36,* 951; *Chem. Abstr.* 1990, *113,* 22431 v); dental caries-inhibiting effect of Japanese tea studies *in vitro* and *in vivo*. Crude polyphenolic fraction of tea effectively inhibited attachment of *Streptococcus mutans* strain JC-2 to saliva-coated hydroxyapatite disks. It also inhibited formation of water-insoluble glucan from sucrose by crude bacterial glucosyltransferase. (-)Epicatechin gallate and (-)epigallocatechin gallate showed very marked inhibition of glucosyltransferase activity (*Caries Res.* 1991, *25,* 438; *Chem. Abstr.* 1992, *116,* 19874 y); purified polyphenol from Chinese green tea decreased oxidative modification of low density lipoprotein by macrophages (*Med. Sci. Res.* 1991, *19,* 767; *Chem. Abstr.* 1992, *116,* 227893 t); camelliaside C exhibited inhibitory effect on arachidonate 5-lipoxygenase of RBL-I cells with EC50 14.0 μM (*Chem. Pharm. Bull.* 1993, *41,* 1185).

C. sinensis (L.) Kuntze var. *assamica* (Mast.) Kitamura; see *C. sinensis* (L.) Kuntze

C. theifera Griff.; see *C. sinensis* (L.) Kuntze

CAMPANULA (Campanulaceae)

C. persicifolia L.

Eng. - Peach bells, Willow bell flower.

Isoquercitrin, rutin and quercetin-3-O-β-rutinosido-7-O-β-D-glucoside identified in aerial parts (*Khim. Prir. Soedin.* 1990, 271; *Chem. Abstr.* 1990, *113,* 74896 v).
Distribution: Introduced into Indian gardens in hilly regions.

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CAMPSIS (Bignoniaceae)

C. chinensis Voss; see *C. grandiflora* (Thunb.) K.Schum.

C. grandiflora (Thunb.) K.Schum. syn *Tecoma grandiflora* (Thunb.) Loisel, *Campsis chinensis* Voss (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.141).

Identification of furfural, 5-methylfurfural, furfurylalcohol and 2-acetylfuran as major constituents in essential oil of Chinese flowers (*Flavour Fragrance J.* 1989, *4,* 103; *Chem. Abstr.* 1993, *118,* 66566 a); two novel flavanone disaccharides isolated from leaves and characterised as naringenin-7-O-α-L-rhamnosyl(1→4)-rhamnoside and dihydrokaempferol-3-O-α-L-rhamnosido-5-O-β-D-glucoside (*J. Chem. Res. Synop.* 1991, 109; *Chem. Abstr.* 1991, *115,* 89104 a).

CANANGA (Annonaceae)

C. odorata Hook.f. & Thoms. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 142).

An alkaloid - ushinsunine N-oxide - isolated from stem bark along with ushinsunine, oxoushinsunine, anonaine, reticuline and coreximine (*Chung-hua Yao Hsueh Tsa Chih* 1989, *41,* 279; *Chem. Abstr.* 1990, *112,* 195191 z); β-caryophyllene, γ-cadinene, benzyl benzoate and α-humulene identified in essential oil of flowers by GC-MS (*Beijing Daxue Xuebao, Ziran Kexueban* 1991, *27,* 645; *Chem. Abstr.* 1992, *117,* 137392 h).

CANARIUM (Burseraceae)

C. mannii King

Oleic (43.3), palmitic (24.3) and stearic (17.5%) acids determined in seed kernel oil (70.0%) by GC-MS (*J. Oil Technol. Assoc. India* 1989, *21,* 59; *Chem. Abstr.* 1991, *114,* 162699 j); agathisflavone isolated (*Planta Med.* 1992, *58,* 493).

Distribution: Andaman Islands.

BIOLOGICAL ACTIVITY

Agathisflavone (50.0 and 100.0 mg, orally) exhibited dose-dependent hepato-protective activity against CCl_4-induced hepatotoxicity in rats and mice (*Planta Med.* 1992, *58,* 493).

CANAVALIA (Papilionaceae)

C. ensiformis (L.) DC.; see *C. gladiata* (Jacq.) DC.

C. ensiformis (L.) DC. var. *virosa* (Roxb.) Baker; see *C. virosa* (Roxb.) Wt.& Arn.

C. gladiata (Jacq.) DC. syn. *C. ensiformis* auct.[non (L.) DC.] (*Compend. Indian. Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 143).

Oleic, linoleic, linolenic, myristic, palmitic, stearic and behenic acids isolated from

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defatted seeds whereas unsaponifiable part afforded lupeol, β-sitosterol and stigmasterol (*Proc. Natl. Acad. Sci. India* 1989, *59*A, 599; *Chem. Abstr.* 1991, *114,* 118532 a; *Acta Cienc. Indica, Chem.* 1990, *16,* 229; *Chem. Abstr.* 1992, *116,* 124869 y); two new pentaamines - aminopropylcanavalmine and aminobutylcanavalmine - isolated from beans and characterised (*Biol. Chem. Polyamines Proc. Argent.-Jpn. Jt. Semin.* 1989, 159; *Chem Abstr.* 1992, *116,* 124863 s; *Phytochemistry* 1990, *29,* 1311); in addition, γ-guanidinooxypropylamine isolated from seedlings (*Biol. Chem. Polyamines Proc. Argent.-Jpn. Jt. Semin.* 1989, 159; *Chem. Abstr.* 1992, *116,* 124863 s); a lectin isolated from beans and purified (*Carbohydr. Res.* 1991, *213,* 275; *Chem. Abstr.* 1991, *115,* 203311 t).

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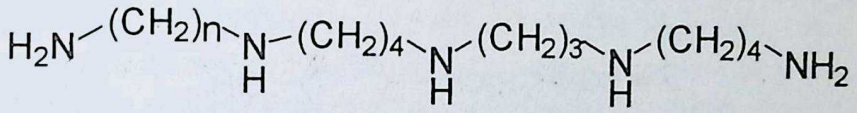

Aminopropylcanavalmine
n = 3
Aminobutylcanavalmine
n = 4

C. virosa (Roxb.) Wt. & Arn. syn. *C. ensiformis* (L.) DC. var. *virosa* (Roxb.) Baker (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 143).

A new lectin (CVL) having carbohydrate binding specificity similar to concanavaline A isolated from seeds (*Fukuoka Daigaku Rigaku Shuho* 1993, *23,* 201; *Chem. Abstr.* 1994, *120,* 187194 c).

CANNABIS (Cannabaceae)

C. sativa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 144).

A process developed for extraction of phenylpropane derivatives; one of which was identical to cannabisin A (Jpn. 2,149,545 (1988) Nov. 30; *Chem. Abstr.* 1990, *113,* 218225 a); cannabinol, tetrahydrocannabinol (THC), cannabidiol and cannabidiolic acid isolated (*Herba Hung.* 1991, *30,* 17; *Chem. Abstr.* 1992, *116,* 18414 m); a new compond - feruloyltyramine - along with p-coumaroyltyramine isolated from seeds, roots, leaves and resin (*Hochudoku* 1991, *9,* 122; *Chem. Abstr.* 1992, *116,* 3588 x); a chiral synthesis of (-)cannabisativine (*Tetrahedron Lett.* 1991, *32,* 1649); a new lignanamide - cannabisin A - isolated from fruits and its structure established; in addition, grossamide, N-trans-caffeoyltyramine, N-trans-feruloyltyramine and N-p-coumaroyltyramine isolated (*Phytochemistry* 1991, *30,* 3013); fruits afforded three more lignanamides - cannabisins B, C and D - whose structures were elucidated (*Phytochemistry* 1992, *31,* 3219); phloroglucinol-β-D-glucoside identified in shoot laticifer exudate; phloroglucinol identified in glandular trichomes (*Phytochemistry* 1994, *37,* 755).

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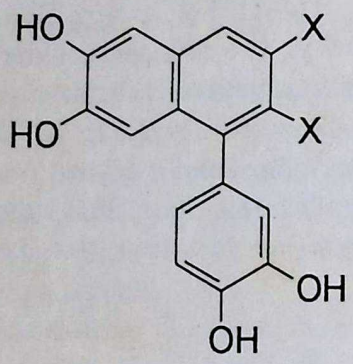

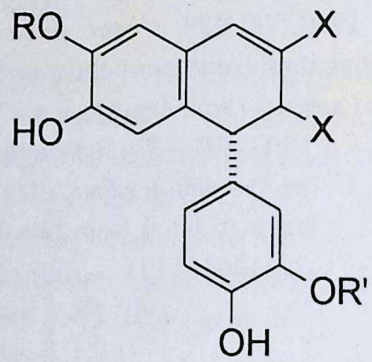

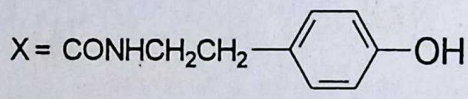

Cannabisin A

Cannabisin B
R,R' = H
Cannabisin C
R = Me, R' = H
Cannabisin D
R,R' = Me

BIOLOGICAL ACTIVITY

Note: 1-Dehydro-tetrahydrocannabinol (1-dehydro-THC) is frequently referred to in literature as 9-dehydro-tetrahydrocannabinol (9-dehydro-THC) and similarly, 6-dehydro-THC is also mentioned as 8-dehydro-THC. In this write-up the practice adopted in earlier volumes of this *Compendium* has been followed: namely, 1-dehydro-THC and 6-dehydro-THC are uniformly used for 9-dehydro-THC and 8-dehydro-THC respectively, irrespective of nomenclature used in the cited publications.

Phenylpropane derivative (I) inhibited plasmin (IC50 0.0027 mM), trypsin (IC50 0.36 mM) and thrombin (44.8% at 1.0 mM) *in vitro* (Jpn. 2,149,545 (1988) Nov. 30; *Chem. Abstr.* 1990, *113*, 218225 a); cannabichromene (0.48 g/kg, i.p.) totally suppressed carrageenin-induced rat paw oedema (US 4,837,228 (1989) Jun. 09; *Chem. Abstr.* 1990, *112*, 48791 s); cannabidiol (0.12 g/kg) inhibited hepatic 6β-testosterone hydroxylase and erythromycin N-demethylase activities (>75%) after 2 hr and appeared to inactivate p-450111A isoenzymes present in hepatic microsomes (*Mol. Pharmacol.* 1990, *38*, 319; *Chem. Abstr.* 1990, *113*, 204747 k).

Acute administration of 1-dehydro-THC (1.0 to 2.0 mg/kg) increased presynaptic dopamine efflux in medial prefrontal cortex of rats (*Eur. J. Pharmacol.* 1990, *190*, 259); 1-dehydro-THC inhibited macrophage cell contact-dependent tumoricidal activity and macrophage extrinsic antiviral activity. Thus, it has potential for affecting diverse functions of macrophage (*Adv. Exp. Med. Biol.* 1991, *288*, 93; *Chem. Abstr.* 1992, *116*, 76204 d; *Proc. Soc. Exp. Biol. Med.* 1992, *199*, 255; *Chem. Abstr.* 1992, *116*, 143677 a); acute administration of 1-dehydro-

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THC (0.2 to 10.0 mg/kg) to rats caused alteration in brain metabolism in limbic and neocortical regions of brain, as assessed by 2-deoxy-D-glucose autoradiography (*Eur. J. Pharmacol.* 1991, *202,* 373); 1-dehydro-THC induced arachidonate release by mouse peritoneal cells in concentration-related manner (*Adv. Exp. Med. Biol.* 1991, *288,* 107; *Chem. Abstr.* 1992, *116,* 76205 e); 1-dehydro-THC suppressed macrophage soluble cytolytic activity by affecting tumor necrosis factor-α(*J. Pharmacol. Exp. Ther.* 1993, *267,* 1558).

Dose effects on subjective and performance measures were determined in seven male volunteers who were moderate users of marijuana. They smoked 4,10 or 25 puffs from cigarettes containing either 1.75 or 3.55% THC on 6 consecutive days. Subjective measures were found to be more sensitive to marijuana effects than performance measures at mean plasma THC levels of 0.17 μg/ml or lower and that large individual differences in extent of performance impairment were apparent at higher plasma THC levels (*J. Pharmacol. Exp. Ther.* 1992, *261,* 114); THC (4.0 to 10.0 mg/kg, i.p.) caused marked hypothermia, a decrease in locomotor activity and concomitant occurrence of bizarre behaviour similar to that caused by hallucinogens. THC (2.0 to 10.0 mg/kg, i.p.) caused catalepsy-like immobilization in rats and animals exhibited muricide and irritable aggression (*Hochudoku* 1994, *12,* 92; *Chem. Abstr.* 1994, *121,* 195665 t).

CAPPARIS (Capparaceae)

C. aphylla Roth; see *C. decidua* (Forsk.) Edgew.

C. decidua (Forsk.) Edgew. syn. *C. aphylla* Roth (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 147).

A new spermidine alkaloid - isocodonocarpine - isolated from root bark and characterised (*Phytochemistry* 1989, *28,* 2493); two other spermidine alkaloids - 14-N-acetylisocodonocarpine and 15-N-acetylcapparisine - from root bark and their structure elucidation (*J. Nat. Prod.* 1992, *55,* 1509).

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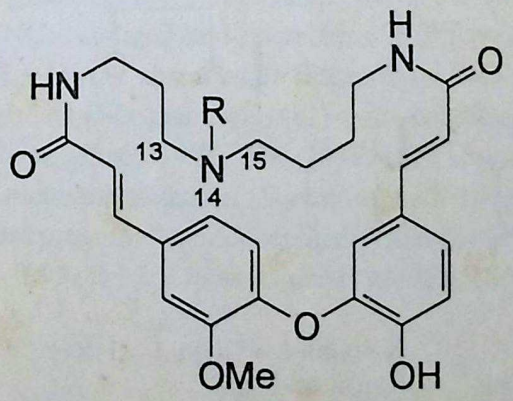

Isocodonocarpine
R = H
14-N-Acetylisocodonocarpine
R = Ac

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BIOLOGICAL ACTIVITY

Capparidisine showed dose-dependent depressant effect on heart rate and coronary flow in isolated rabbit heart. Maximum fall in coronary flow observed at 1.0 μg/ml. Contraction of heart rate increased at 2.0 ng dose and then upto 128.0 and 32.0 ng a dose-dependent fall was observed in force of contraction and heart rate respectively (*Pakistan J. Pharmacol.* 1989, *6*, 61; *Chem. Abstr.* 1991, *114*, 35631 f).

C. sepiaria L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 138).

Betulin-28-acetate isolated and characterised; in addition, octacosanol, β-sitosterol, its glucoside and α-amyrin isolated (*J. Indian Chem. Soc.* 1991, *68*, 633).

CAPSICUM (Solanaceae)

C. annuum L.; see *C. annuum* L. var. *annuum*

C. annuum L. var. *annuum* syn. *C. annuum* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 148).

Two new steroidal glycoside - capsicosides C2 and C3 - isolated from roots and characterised (*Khim. Prir. Soedin.* 1989, 582; *Chem. Abstr.* 1990, *112*, 95502 h); identification of lauric, myristic, palmitic, palmitoleic, stearic, oleic, linoleic, linolenic, arachidic and behenic acids by GC (*Nauchni Tr.-Vissh Inst. Khranit. Vkusova Prom-st, Plovdiv* 1990, *37*, 133; *Chem. Abstr.* 1992, *117*, 211197 s); ornithine, glycine, threonine, dl-dopa and phytosterols identified in root culture (*Indian Drugs* 1991, *28*, 525).

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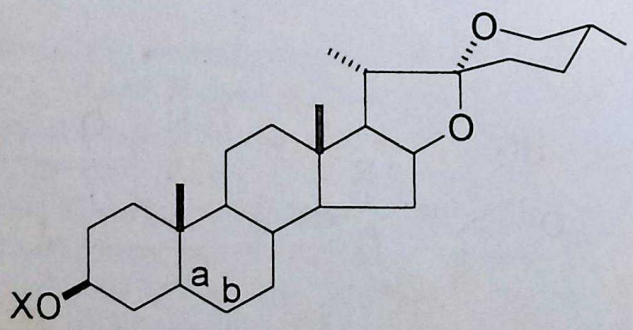

X = Gal(4→1)Glu(3→1)Xyl
Capsicoside C2
Capsicoside C3
ab = Δ

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BIOLOGICAL ACTIVITY

Capsaicin in concentration of 0.1 to 1.0 μM induced relaxation in precontracted longitudinal muscle strips of rat gastric fundus which was potentiated by hexamethonium (*Eur. J. Pharmacol.* 1991, *195,* 131); capsaicin at concentrations previously shown to activate sensory afferent neurons, markedly inhibited responsiveness of platelets to aggregation by agonists (*Eur. J. Pharmacol.* 1991, *202,* 129); effects of intrathecal pretreatment with capsaicin on spinal antinociception by morphine examined. Pretreatment with capsaicin (50.0 μg) for 7 to 11 days reduced action of morphine in hot plate test but not in rat tail flick test (*J. Pharmacol. Exp. Ther.* 1991, *258,* 370); in mouse right main bronchus, both exogenous tachykinins and capsaicin did not show contractile effect while they produced indomethacin-sensitive relaxations which are mediated by stimulation of NK1 receptors, thought to be located on epithelial cells (*Brit. J. Pharmacol.* 1992, *105,* 968); central vagal and local axon reflex components of bronchoconstrictor responses evoked by inhalation of capsaicin aerosol in 5,10 and 15 breaths, determined in anaesthetised guinea pigs. Results suggest that capsaicin-induced bronchoconstrictor responses are mediated by at least two mechanisms, a vagal and/or cholinergic reflex pathway and a noncholinergic pathway (*Brit. J. Pharmacol.* 1992, *105,* 448); inhibitory effects of capsaicin on cellular responses evoked by acetylcholine and by ATP investigated in rat phaeochromocytoma Pc12 cells. Results suggest that low concentrations of capsaicin selectively antagonize responses mediated by nicotinic receptor channels without affecting those mediated by purinoceptor-coupled channels (*Brit. J. Pharmacol.* 1994, *113,* 296); sensitivity of auditory neurons in spiral ganglion to capsaicin was investigated in preparations from postnatal hamsters of age groups 6 to 22 days. Capsaicin altered shape, size and staining characteristic of spiral ganglion cells from all age groups (*Int. J. Dev. Neurosci.* 1994, *12,* 517; *Chem. Abstr.* 1994, *121,* 271924 u).

CARALLUMA (Asclepiadaceae)

C. tuberculata N.E. Brown syn. *Boucerosia aucheriana* Decne. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 150).

Ten pregnane glycosides - boucerosides-ANC, -ADC, -ANO, -ADO, -BNO, -BDO, -BNC, -BDC, -CNO and -CNC - isolated and characterised (*Phytochemistry* 1990, *29,* 229); luteolin-4'-O-β-D-glucosyl(2→1)-α-L-rhamnoside, kaempferol-7-O-β-D-glucosyl(2→1)-α-L-rhamnoside and kaempferol-3-O-β-D-glucosyl(6→1)-α-L-rhamnoside isolated (*Pakistan J. Pharm. Sci.* 1990, *3,* 27; *Chem. Abstr.* 1991, *114,* 203554 d); isolation of a new pregnane - caratuberside A2 - and its structure elucidation (*Spectrosc. Lett.* 1993, *26,* 1427; *Chem. Abstr.* 1994, *120,* 86201 x); two more pregnane - caratubersides C and D - isolated and their structures established (*Nat. Prod. Lett.* 1993, *2,* 97; *Chem. Abstr.* 1994, *120,* 265789 s).

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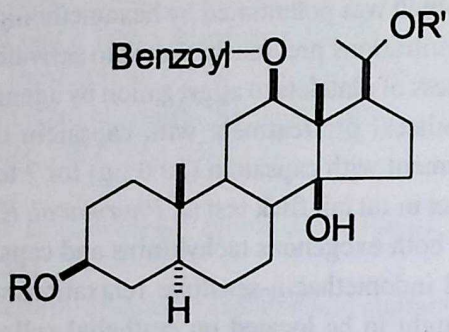
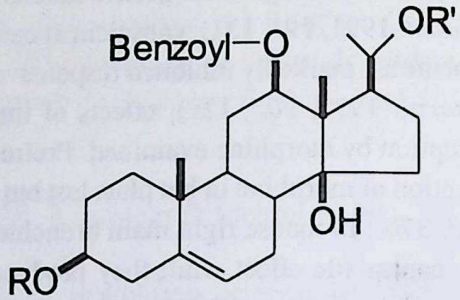
NEW COMPOUNDS

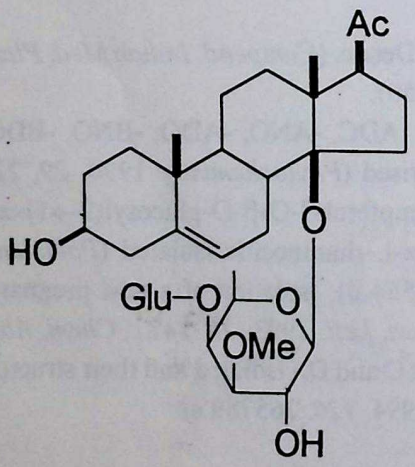




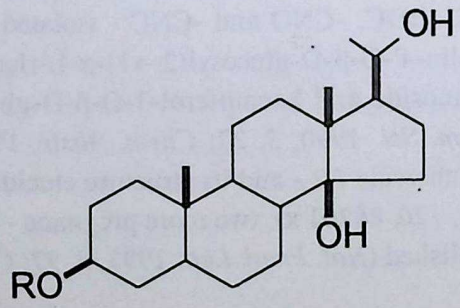
Bouceroside-ANC
R = X, R' = H
Bouceroside-ANO
R = Y, R' = H
Bouceroside-BNO
R = Y, R' = Ac
Bourceroside-BNC
R = X, R' = Ac
Bouceroside-CNC
R = X, R' = Benzoyl
Bouceroside-CNO
R = Y, R' = Benzoyl

Bouceroside-ADC
R = X, R' = H
Bouceroside-ADO
R = Y, R' = H
Bouceroside-BDO
R = Y, R' = Ac
Bouceroside-BDC
R = X, R' = Ac

X = Cymarose(4→1)Cymarose(4→1)Allose
Y = Cymarose(4→1)Oleandrose(4→1)Allose



Caratuberside A2



Caratuberside C
R = Fucose(3-OMe)(4→1)Glu(4→1)Glu
Caratuberside D
R = Fucose(3-OMe)(4→1)Glu(6→1)Glu

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CARAPA (Meliaceae)

C. granatum (Koen.) Alston; see *Xylocarpus granatum* Koen.

C. moluccensis Hiern; see *Xylocarpus moluccensis* (Lamk.) Roem.

C. moluccensis Lamk.; see *Xylocarpus granatum* Koen.

C. obovata Blume; see *Xylocarpus granatum* Koen.

CARDAMINE (Brassicaceae)

C. impatiens L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 77).

Rutoside, hyperoside, 7-rhamnoside and 7-rhamnoglucoside of kaempferol isolated from aerial parts (*Acta Pol. Pharm.* 1991, *48, 55; Chem. Abstr.* 1993, *118,* 143472 w).

CARDIOSPERMUM (Sapindaceae)

C. canescens Wall.

β-Amyrin, β-sitosterol, 7-O-β-D-glucuronides of apigenin, luteolin and 3,4'-di-O-methylluteolin isolated from leaves (*Herba Pol.* 1992, *38,* 151; *Chem. Abstr.* 1994, *120,* 4571 f). Distribution: Peninsular India.

C. helicacabum L. (*Compend. Indian. Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 151).

An efficient and enantiodivergent synthesis of (+) and (-)pinitols (*J. Am. Chem. Soc.* 1990, *112,* 9439); arachidic acid, apigenin and β-sitosterol-β-D-galactoside isolated (*Indian Drugs* 1990, *27,* 257).

CARDUUS (Asteraceae)

C. tenuiflorus Curtis

A new coumarin, hemiterpene ether isolated, characterised as 6-(3,3-dimethylallyloxy)-7-methoxycoumarin and synthesised (*Phytochemistry* 1992, *31,* 3989).
Distribution: Kashmir.

CARICA (Caricaceae)

C. papaya L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 152).

Carotenoid fraction contains β-carotenoids (87.7%); chlorophylls, carotenoids and rutin isolated from leaves (*Khim. Prir. Soedin.* 1990, 120; *Chem. Abstr.* 1990, *112,* 213914 u).

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BIOLOGICAL ACTIVITY

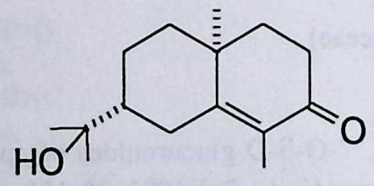
Carpaine administered s.c. or i.p. in low doses (1.0 to 5.0 mg/kg) to mice, rats and rabbits caused dilatation of skin blood vessels, hypotension and cardiostimulation. Doses >10.0 mg/kg showed opposite effects. Carpaine (1.0 to 5.0 mg/kg, i.v.) induced myocardial ischemia. Mechanism of carpaine effects may be dopaminergic (*Soobshch. Akad. Nauk Gruz.* 1992, *144*, 441; *Chem. Abstr.* 1993, *118*, 183104 j).

CARISSA (Apocynaceae)

C. opaca Stapf ex Haines syn. *C. spinarum* auct. (non L.) (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 144).

Crystal structure of carissone (*Monatsh. Chem.* 1990, *121*, 941; *Chem. Abstr.* 1991, *114*, 229170 a).

NEW COMPOUNDS



Carissone

C. spinarum L.; see *C. opaca* Stapf ex Haines

CARMONA (Ehretiaceae)

C. microphylla (Lamk.) G.Don; see *C. retusa* (Vahl) Masamune

C. retusa (Vahl) Masamune syn. *C. microphylla* (Lamk.) G.Don (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 136).

α-, β-Amyrins and bauerenol isolated (*Philipp. J. Sci.* 1992, *121*, 413; *Chem. Abstr.* 1994, *120*, 27492 v).

CARTHAMUS (Asteraceae)

C. lanatus L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 153).

Two new sesquiterpene glycosides isolated and their structures determined as bisabolane fucoside and trinor-bisabolane fucoside and confirmed by synthesis (*Phytochemistry* 1990, *29*, 645); two new eudesmane glycosides - intermedeol-β-D-fucopyranoside and its 2'α-methylbutyryl derivative - isolated and characterised (*Phytochemistry* 1990, *29*, 3207); seeds afforded a new serotonin derivative characterised as N-(p-methoxycinnamoyl)-serotonin-β-D-glucoside; in addition, apigenin and quercitrin isolated (*Mansoura J. Pharm. Sci.* 1993, *9*, 234; *Chem. Abstr.* 1994, *121*, 53914 z).

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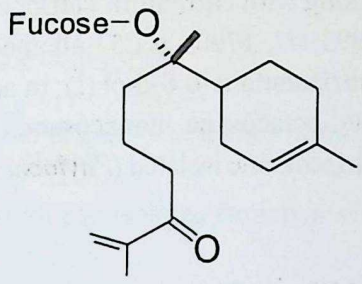
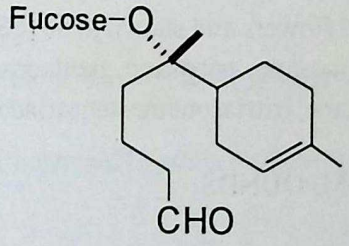
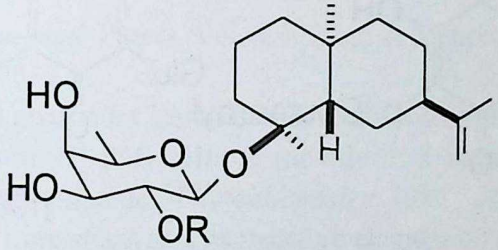


Bisabolane fucoside



Tri-nor-bisabolane fucoside



Intermedeol-β-D-fucoside
R = H
Intermedeol-β-D-(2'α-methylbutyryl)-fucoside
R = 2-Me butyryl

C. tinctorius L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 153).

Safflower yellow (SY), a mixture of chalconoid compounds, (1.0 to 2.0 g/kg/day, i.g.) lowered blood pressure of spontaneously hypertensive rats (SHR) from 1.86 to 3.86 K.Pa. Five week after administration of SY, plasma renin activity and angiotensin II level were diminished in SHR group. Results suggest that decrease of blood pressure may be mediated by renin-angiotensin system (*Yaoxue Xuebao* 1992, *27,* 785; *Chem. Abstr.* 1993, *118,* 73368 r).

Propanetriol-1-O-glucopyranosyl(4→1)-arabinopyranoside isolated (Jpn. 1,275,593 (1989) Nov. 06; *Chem. Abstr.* 1990, *112,* 204663 j); volatile oil of buds, leaves and stems contained 1-pentadecene as major compound; flower oil contained mixture of polyacetylenes. 1,2,3-Trimethoxy-5-methylbenzene identified in plant (*J. Agric. Food Chem.* 1990, *38,* 1245; *Chem. Abstr.* 1990, *112,* 213888 p); luteolin-7-O-glucoside isolated from seedlings (*J. Adv. Sci.* 1990, *2,* 77; *Chem. Abstr.* 1991, *115,* 5145 d); yellow and red pigments isolated and identified as safflor yellow A and carthamin respectively (*Zhongcaoyao* 1990, *21,* 188; *Chem. Abstr.* 1990, *113,* 103260 r); kaempferol, its 3-glucoside and 3-rutinoside, 6-hydroxykaempferol, quercetin, its 3-glucoside, 7-glucoside and 3-rutinoside isolated (*Yakhak Hoechi* 1992, *36,* 556; *Chem. Abstr.* 1993, *119,* 79945 u); astragalin, quercetin, rutin and kaempferol-3-rutinoside from flowers (*Planta Med.* 1992, *58,* 285); 6-hydroxykaempferol, its 3-glucoside, 3,6-diglucoside, 3,6,7-triglucoside and 3-rutinosido-6-glucoside isolated from dried petals (*Phytochemistry* 1992, *31,* 4001); isolation and structure elucidation of a new N-containing quinochalcone glycoside - tinctormine - from

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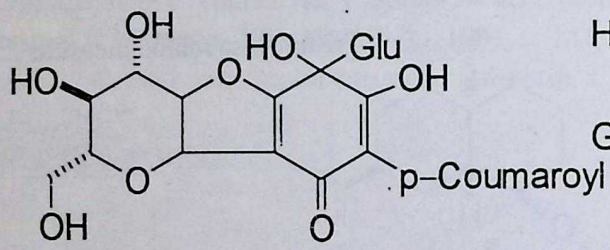
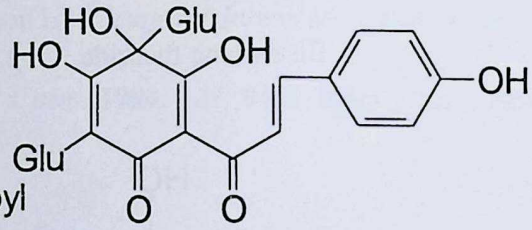
safflower (*Chem. Pharm. Bull.* 1992, *40,* 3355; *ibid.* 1993, *41,* 1796); another new quinochalcone C-glycoside - hydroxysafflor yellow A - also isolated along with carthamin, safflor yellow B and safflomin C and characterised (*Chem. Pharm. Bull.* 1993, *41,* 1796); a C31 alkanediol isolated from dried flowers and shown to be (6S,8R)erythro-hentriacontane-6,8-diol (I); in addition, 6,8-diols of eicosane, tricosane, pentacosane, heptacosane, octacosane, nonacosane, triacontane, dotriacontane, tritriacontane, tetratriacontane and pentatriacontane isolated (*Phytochemistry* 1994, *36,* 105).

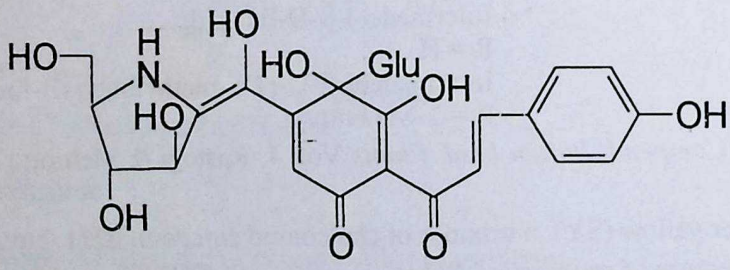
NEW COMPOUNDS



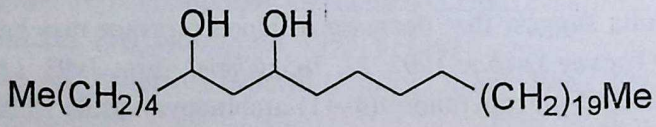
Safflor yellow A



Hydroxysafflor yellow A



Tinctormine



I

CARUM (Apiaceae)

C. copticum Benth. & Hook.f.; see *Trachyspermum ammi* (L.) Sprague

CARVIA (Acanthaceae)

C. callosa (Nees) Bremek. syn. *Strobilanthes callosus* Nees (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 146).

Methylchavicol (24.0), terpinen-4-ol (19.0), cis-sabinen hydrate (9.0), α-terpineol (5.0) and trans-sabinene hydrate (3.0%) determined by GC-MS in essential oil of post-flowering plants from central India whereas oil from pre-flowering plants contained terpinen-4-ol (23.0),

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cis-sabinene hydrate (14.0), trans-sabinene hydrate (5.0) and α-terpineol (5.0%) (*J. Essent. Oil Res.* 1992, *4*, 281; *Chem. Abstr.* 1993, *118*, 209413 m).

CASIMIROA (Rutaceae)

C. edulis Llave & Lex (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 155).

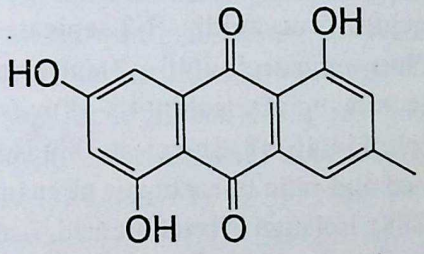
A D-glucan isolated from fruits and partially characterised (*Indian J. Chem.* 1992, *31*B, 793).

CASSIA (Caesalpiniaceae)

C. alata L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 155).

Two new flavonoid glycosides isolated from seeds and characterised as chrysoeriol-7-O-(2''-O-β-D-mannopyranosyl)-β-D-allopyranoside and rhamnetin-3-O-(2''-O-β-D-mannopyranosyl)-β-D-allopyranoside (*Phytochemistry* 1991, *30*, 2761); isolation of an anthraquinone - alatinone - from stems and its structure elucidation (*Phytochemistry* 1993, *32*, 1616); another anthraquinone derivative - alatonal - isolated from stems and its structure established as 2-formyl-1,3,8-trihydroxyanthraquinone (*Indian J. Chem.* 1994, *33B*, 92).

NEW COMPOUNDS



Alatinone

C. angustifolia Vahl; see *C. senna* L. var. *senna*

C. auriculata L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 140).

Four dimeric procyanidins isolated from stem bark and characterised as fisetinidol (4α→8'')catechin, fisetinidol(4α→8'')epicatechin, fisetinidol(4α→8'')gallocatechin and fisetinidol(4α→8'')epigallocatechin (*PZ Wiss.* 1990, *3*, 157; *Chem. Abstr.* 1991, *114*, 139761 q); isolation of a new flavone glycoside from roots and its characterisation as 7,4'-dihydroxyflavone-5-O-β-D-galactopyranoside (*J. Bangladesh Acad. Sci.* 1990, *14*, 57; *Chem. Abstr.* 1991, *114*, 160641 k); 1,5,8-trihydroxy-6-methoxy-2-methylanthraquinone-3-O-β-D-galactopyranosyl(1→4)-O-β-D-mannopyranoside isolated from seeds and characterised (*J. Bangladesh Acad. Sci.* 1993, *17*, 119; *Chem. Abstr.* 1994, *120*, 4563 e); a new anthocyanidin glycoside isolated

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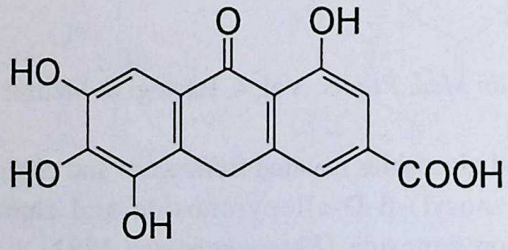
from heartwood and its structure established as pelargonidin-5-O-β-D-galactoside (*Asian J. Chem.* 1994, *6*, 696; *Chem. Abstr.* 1994, *121*, 153335 e).

C. didymobotrya Fresen.

A new anthrone derivative - didyronic acid - isolated from pods and its structure elucidated as 1,5,6,7-tetrahydroxyanthrone-3-carboxylic acid; in addition, chrysophanol, physcion, fallacinol, isorhamnetin, β-sitosterol and its glucoside isolated (*Indian J. Chem.* 1994, *33*B, 312).
Distribution: Native of East Africa, introduced into Indian gardens.
NEW COMPOUNDS



Didyronic acid

C. fistula L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 155).

Ethanolic extract of root lowered blood sugar level upto 30% after 2 hr in fasting rats (*Fitoterapia* 1993, *64*, 93).

(+)Catechin, epicatechin, procyanidin B-2, epicatechin(4β→8)ent-epicatechin, epicatechin(4β→8)epiafzelechin, epicatechin(4β→8)ent-epiafzelechin, (+)epiafzelechin, epiafzelechin(4β→8)epiafzelechin, epiafzelechin(4β→8)ent-epiafzelechin, epiafzelechin (4β→8)epicatechin and epiafzelechin(4β→8)ent-epicatechin isolated from pods; enantiomers of these compounds also isolated and ratio of each pair of enantiomers determined by HPLC (*Chem. Pharm. Bull.* 1990, *38*, 888); isolation of betulinic acid, 7-methylphyscion and β-sitosterol from roots (*Fitoterapia* 1993, *64*, 93).

C. floribunda Cav. syn. *C. laevigata* Willd. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 157).

A water-soluble galactomannan isolated from seeds on hydrolysis yielded galactose and mannose in molar ratio of 5:2 (*Egypt. J. Chem.* 1988, *31*, 615; *Chem. Abstr.* 1992, *116*, 148191 x; *Acta Cienc. Indica, Chem.* 1989, *15*, 287; *Chem. Abstr.* 1990, *112*, 155296 f; *Acta Cienc. Indica, Chem.* 1990, *16*, 93; *Chem. Abstr.* 1992, *116*, 190974 e).

C. glauca Lamk.; see *C. surattensis* Burm.f.

C. grandis L.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 157).

Isolation of three new anthraquinone glucosides from seeds and their characterisation as 1,2,4,8-tetrahydroxy-6-methoxy-3-methylanthraquinone-2-O-β-D-glucopyranoside,

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3-hydroxy-6,8-dimethoxy-2-methylanthraquinone-3-O-β-D-glucopyranoside and 1,3-dihydroxy-6,7,8-trimethoxy-2-methylanthraquinone-3-O-β-D-glucopyranoside; structures confirmed by synthesis (*Pol. J. Chem.* 1992, *66,* 469; *Chem. Abstr.* 1993, *118,* 3859 c; *Nat. Prod. Lett.* 1993, *2,* 83; *Chem. Abstr.* 1994, *120,* 212583 p).

C. hirsuta L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 157).

Ombuin, quercetin, rutin, kaempferol and its 3-O-rutinoside isolated from dried flowers (*Fitoterapia* 1992, *63,* 475).

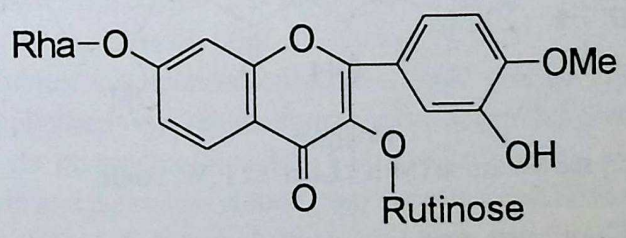
C. holosericia Fresen.(*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 158).

Linoleic (57.32), oleic (19.06). palmitic (15.22), stearic (6.69), arachidic (0.560), lauric (0.135), linolenic (0.10), myristic (0.034), behenic (0.011) and palmitoleic (0.008) acids determined in fixed oil (5.6%) of seeds by GC-MS (*Pakistan J. Sci. Ind. Res.* 1989, *32,* 643; *Chem. Abstr.* 1990, *112,* 95581 h).

C. italica (Mill.) Lam. ex F.W. Andr. syn. *C. obovata* (L.) Collad. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 158).

A new flavonoid glycoside - tamarixetin-3-rutinosido-7-rhamnoside (I) - along with kaempferol and quercetin isolated; apigenin-, kaempferol- and quercetin-7-glucosides, kaempferol- and quercetin-3-rutinosides, isorhamnetin- and apigenin-3-rutinosido-7-rhamnosides also isolated (*Phytochemistry* 1992, *31,* 2187); leaves afforded a mixture of hydrocarbons and β-sitosterol (*Aswan Sci. Technol. Bull.* 1992, *13,* 15; *Chem. Abstr.* 1993, *119,* 68059 g); an anthraquinone derivative - 1,5-dihydroxy-3-methylanthraquinone - isolated along with β-sitosterol, stigmasterol and α-amyrin (*Phytochemistry* 1994, *36,* 761).

NEW COMPOUNDS



I

BIOLOGICAL ACTIVITY

1,5-Dihydroxy-3-methylanthraquinone showed antimicrobial and antitumor activities (*Phytochemistry* 1994, *36,* 761).

C. javanica L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 158).

(–)Epicatechin, (–)epiafzelechin, epiafzelechin(4β→8)epiafzelechin, ent-epiafze-

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lechin(4α→8)epiafzelechin, epiafzelechin(4β→8)epicatechin, ent-epiafzelechin (4α→8)-epicatechin and epiafzelechin(4β→8)ent-epiafzelechin(4α→8)epiafzelechin isolated from bark (*Chem. Pharm. Bull.* 1990, *38,* 888); 1,3,4,6-tetrahydroxy-5,8-dimethoxy-2-methylanthraquinone isolated from stem bark and its structure elucidated (*Indian J. Chem.* 1994, *33*B, 203); 1,4-dihydroxy-6,7,8-trimethoxy-2-methylanthraquinone isolated from stem bark and its structure confirmed by synthesis (*Fresenius Environ. Bull.* 1994, *3,* 86; *Chem. Abstr.* 1994, *121,* 153313 w).

C. laevigata Willd.; see *C. floribunda Cav.*

C. marginata Roxb.; see *C. roxburghii* DC.

C. montana Heyne ex Roth

Guj. - Jhadoval, Mindhi, Motivala; Kan. - Bettadatangadi; Tel. - Kondatangeedu.

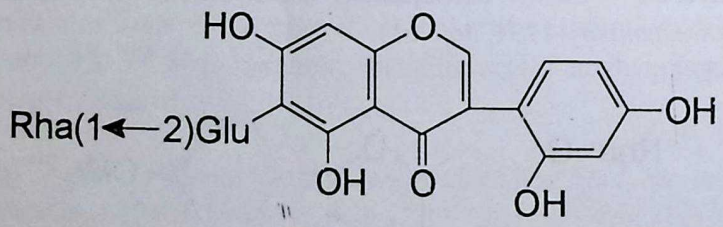
Kaempferol, its 3-O-rutinoside, quercetin and rutin isolated from heartwood (*Indian J. Nat. Prod.* 1991, *7*(1), 18; *Chem. Abstr.* 1992, *116,* 170211 a).

Distribution: Andhra Pradesh, Gujarat, Karnataka and Tamil Nadu, ascending to 900 m.

C. nodosa Buch.-Ham. ex Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 159).

A new C-glycosyl isoflavone - nodosin - isolated from flowers and characterised as 2'-hydroxygenistein-6C-α-L-rhamnopyranosyl(1→2)-glucopyranoside; 8C-glucopyranosyl-genistein and dalpanitin also isolated (*J. Chem. Res. Synop.* 1994, 88; *Chem. Abstr.* 1994, *121* 5099 r).

NEW COMPOUNDS



Nodosin

C. obovata (L.) Collad.; see *C. italica* (Mill.) Lam. ex F.W. Andr.

C. obtusifolia L. syn. *C. tora* auct. (non L.) p.p. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 159).

Two new naphthopyrone glycosides - 9-[(β-D-glucopyranosyl(1→6)-O-β-D-glucopyranosyl)oxy]-10-hydroxy-7-methoxy-3-methyl-1H-naphtho[2,3-C]pyran-1-one (I) and 6-[(α-apiofuranosyl(1→6)-O-β-D-glucopyranosyl)oxy]-rubrofusarin (II) - isolated from seeds along with cassiaside and rubrofusarin-6β-gentiobioside and their structures elucidated (*Planta Med.* 1989, *55,* 276); structure of cassialactone revised to (S)3,4-dihydro-9,10-dihydroxy-3-hydroxymethyl-7-1H-naphtho(2,3-C)pyran-1-one by X-ray analysis (*Phytochemistry* 1990, *29,*

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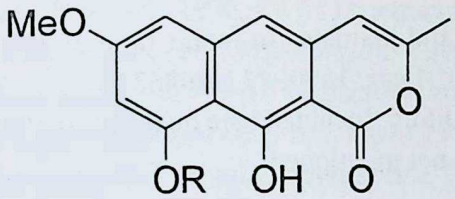
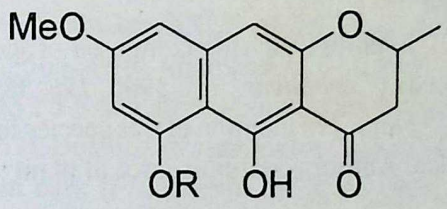
999); brassinolide, castasterone, typhasterol, teasterone, 28-norcastasterone, monopalmitin and monoolein isolated from immature seeds (*Biosci., Biotechnol., Biochem.* 1994, *58,* 1343; *Chem. Abstr.* 1994, *121,* 129996 a).

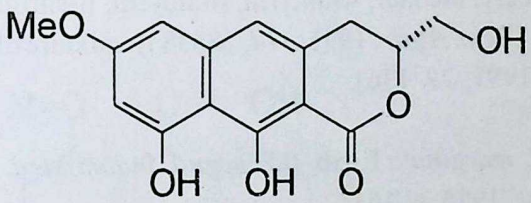
NEW COMPOUNDS



I
R = Glu(6→1)Glu



II
R = Glu(6→1)Apiose



Cassialactone

BIOLOGICAL ACTIVITY

Cassiaside, rubrofusarin-6β-gentiobioside and naphthopyrone glycoside (II) showed significant hepatoprotective effect against galactosamine damage (*Planta Med.* 1989, *55,* 276); rat colon perfused interaluminally *in vitro* released histamine into perfusates, which was increased by rhein (1.0 to 10.0 μg/ml) and much more by rhein anthrone (0.1 to 10.0 μg/ml) but not by sennosides A or B (1.0 to 10.0 μg/ml) (*Eur. J. Pharmacol.* 1990, *191,* 97); after intracaecal administration neither rhein nor rhein anthrone accelerated transit of colour maker through large intestine in germ-free rats. Both compounds reduced net absorption of sodium chloride in colon and enhanced net potassium secretion (*Eur. J. Pharmacol.* 1992, *212,* 121); emodin in dose-dependent manner exhibited vasorelaxant effect on isolated vascular rings of human internal mammary artery and saphenous vein, rabbit thoracic aorta, abdominal aorta and mesentric artery and rat thoracic aorta. In presence of emodin (10.0 μM), contractile response of rat aorta to phenylephrine, serotonin and potassium chloride was depressed and relaxation response to acetyl choline was attenuated (*Eur. J. Pharmacol.* 1991, *205,* 289); emodin (1.0 to 30.0 μM) in dose-dependent manner relaxed rat thoracic aortic rings precontracted with phenylephrine. Emodin (0.3 μM to 0.1 mM) also suppressed responses of human mononuclear cells to phytohaemagglutinin and mixed lymphocyte reaction in dose-dependent manner. It may be useful as new template for development of better immuno-suppressive agents with vasorelaxant action for use against transplantation rejection and autoimmune disease (*Eur. J. Pharmacol.* 1991, *198,* 211); immuno-suppressive effect of emodin investigated in human mononuclear cells stimulated with 0.25% phytohaemagglutinin for 24, 48 and 72 hr; presence of emodin (1.0 to 30 μM)

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reduced proliferative response as determined by uptake of tritiated thymidine in dose-dependent manner (*Eur. J. Pharmacol.* 1992, *211,* 359); activity of monoolein was one-fifth that of brassinolide but higher than that of indole-3-acetate acid in rice lamina inclination bioassay (*Biosci., Biotechnol., Biochem.* 1994, *58,* 1343; *Chem. Abstr.* 1994, *121,* 129996 a).

C. ovata

A polysaccharide composed of galactose and mannose in molar ratio of 2:5 isolated from seeds (*Carbohydr. Res.* 1990, *198,* 384; *Chem. Abstr.* 1990, *113,* 20862 n).

Note : No mention of this species in Indian Flora. Included here on the basis of aforesaid reference. Authors citation/source of plant material not mentioned.

C. renigera Wall. ex Benth. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 152).

Leaves afforded ceryl alcohol, α-amyrin, β-amyrin, β-sitosterol and betulin (*Indian J. Nat. Prod.* 1989, *5*(2), 16; *Chem. Abstr.* 1991, *114,* 58838 t); mixture of α- and β-amyrins isolated from bark (*Indian Drugs* 1991, *29,* 136).

C. roxburghii DC. syn. *C. marginata* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 161).

A new flavone glycoside isolated from roots and characterised as 5,7-dihydroxy-6-methoxyflavone-4'-O-neohesperidoside (*J. Indian Chem. Soc.* 1993, *70,* 271).

C. senna L. var. *senna* syn. *C. angustifolia* Vahl (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 161).

Sennosides A and B in leaves, flowers and fruits determined as 0.59 and 0.72, 1.06 and 1.10, 0.98, and 1.35% respectively (*Toyama-Ken Yakuji Kenkyusho Nenpo* 1988, 86; *Chem. Abstr.* 1990, *113,* 228008 w); sennosides A and B also isolated from seedlings (*Chem. Pharm. Bull.* 1989, *37,* 2744; Jpn. 2,174,790 (1990) Jul. 06; *Chem. Abstr.* 1991, *144,* 49561 v); a process developed for preparation of sennosides A, B and AI (Ger. 4,120,991(1993) Jan. 7; *Chem. Abstr.* 1993, *119,* 34301 q).

BIOLOGICAL ACTIVITY

Sennosides A and B inhibited bovine serum monoamine oxidase activity; IC50 of sennosides A and B 17.0 and 9.0 μM respectively (*Chem. Pharm. Bull.* 1989, *37,* 2744); rhein anthrone (12.48 mg/kg) induced diarrhoea in rats approximately 20 min after intracaecal administration but pretreatment with prostagladin biosynthesis inhibitor, indomethacin (10.0 mg/kg, i.p.), suppressed onset of diarrhoea. Rhein anthrone stimulated PGE2 release into rat colonic lumen which was depressed by indomethacin (*J. Pharm. Pharmacol.* 1991, *43,* 307).

C. siamea Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 162).

1-Hydroxy-6,8-dimethoxy-2-methylanthraquinone-3-O-rutinoside isolated from roots

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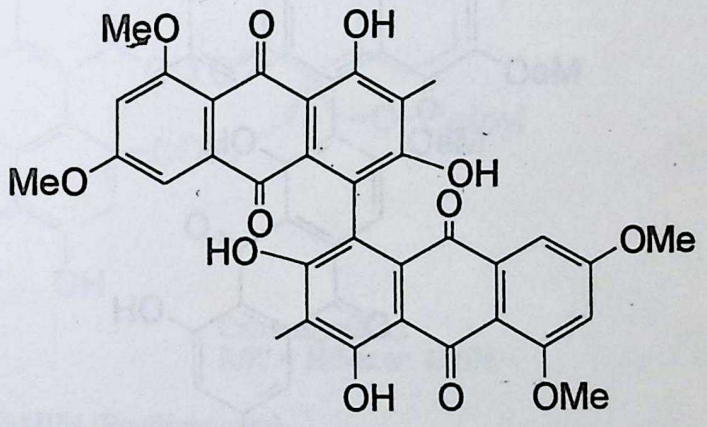
(*J. Indian Chem. Soc.* 1991, *68,* 254); a new bianthraquinone - 4,4'-bis(1,3-dihydroxy-6,8-dimethoxy-2-methylanthraquinone) (I) - isolated from heartwood and its structure determined; 1,1'-bis (4,5-dihydroxy-2-methylanthraquinone), chrysophanol and emodin also isolated (*Phytochemistry* 1992, *31,* 2176); 6α,7α:22,26:24,25-triepoxy-5,26-dihydroxy-17 (13→18)abeo-5α-ergosta-2,13,15,17-tetraen-1-one (Nic-1) and 11-hydroxyhexacosan-2-one isolated from bark (*J. Indian Chem. Soc.* 1992, *69,* 111); tetracontanol (0.78) and lup-20(29)-en-1β,2β-diol (10.2%) determined in leaves (*Fitoterapia* 1992, *63,* 556); root afforded 6,8-dimethoxy-2-methylanthraquinone-3-O-β-D-galactopyranoside and 1,5,8-trihydroxy-2-methylanthraquinone-3-O-β-D-galactopyranoside (*Fitoterapia* 1993, *64,* 63); isolation of rhamnetin-3-O-(6"-O-α-L-rhamnopyranosyl)-β-D-galactopyranoside from stem bark (*Fitoterapia* 1993, *64,* 90); a new triterpenoid glycoside - 19α,24-dihydroxyurs-12-en-28-oic acid-3-O-β-D-xylopyranoside - isolated along with chrysophanol and physcion (*Int. J. Pharmacog.* 1994, *32,* 65; *Chem. Abstr.* 1994, *121,* 104079 r).

NEW COMPOUNDS



I

BIOLOGICAL ACTIVITY

NIC-1 showed antifeedant and insecticidal activities (*J. Indian Chem. Soc.* 1992, *69,* 111).

C. surattensis Burm.f. syn. *C. glauca* Lamk. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 54).

Linoleic (42.91), palmitic (30.35), oleic (23.49), linolenic (1.62), stearic (1.31) and arachidic (0.28%) acids determined in seed oil by GC-MS (*J. Indian Chem. Soc.* 1990, *67,* 864); a water-soluble biopolymer composed of galactose and mannose in molar ratio of 1:3 isolated from seeds and partially characterised (*Int. J. Pharmacog.* 1991, *29,* 14; *Chem. Abstr.* 1991, *115,* 155027f); 8-hydroxy-6-methoxy-3-methylanthraquinone-1-O-α-L-rhamnopyranosyl(1→6)-β-D-glucopyranoside isolated from stem and characterised (*J. Bangladesh Acad. Sci.* 1991, *15,* 193; *Chem. Abstr.* 1992, *116,* 148195 b); isolation of chrysophanol and physcion from stem bark (*J. Indian Chem. Soc.* 1993, *70,* 653; *Indian J. Pharm. Sci.* 1994, *56,* 33); in addition, stearic acid, β-

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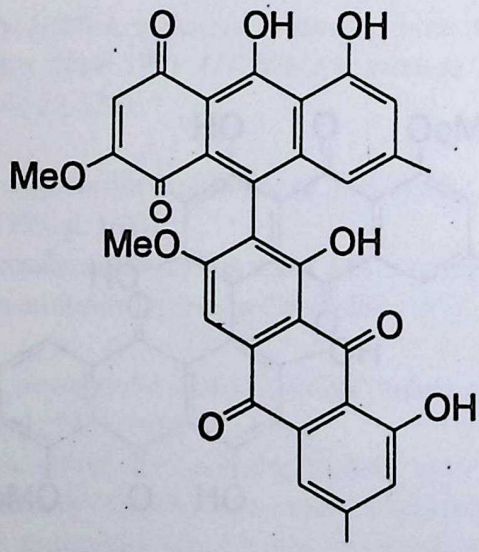
sitosterol and its glucoside isolated from stem bark (*Indian J. Pharm. Sci.* 1994, *56,* 33); γ-sitosterolin and digitolutein - isolated from seeds (*Natl. Acad. Sci. Lett.* 1994, *17,* 21).

C. tomentosa L.f. syn. *Senna multiglandulosa* (Jacq.) Irwin & Barneby

Quercetin-7-3'-dimethyl ether-3-O-galactoside, hyperin, anthrone glucoside, kaempferol-3-O-galactorhamnoside, 24-ethylcholest-24-en-3β-ol, α-amyrin and β-sitosterol isolated from leaves (*Bull. Fac. Sci., Assiut Univ.* 1991, *20,* 115; *Chem. Abstr.* 1992, *116,* 170131 z); isolation of a new bianthraquinone - sengulone (9-(physcion-7'-yl)-5,10-dihydroxy-2-methoxy-7-methyl-1,4-anthraquinone) and its structure elucidation; emodin, floribundone 1, torosanin-9',10'-quinone and anhydrophlegmacin-9',10'-quinone also isolated (*Phytochemistry* 1994, *35,* 465).

Distribution: Native of tropical America, now runs wild in the hills of southern India.

NEW COMPOUNDS



Sengulone

C. tora L.; see *C. obtusifolia* L.

CASTANEA (Fagaceae)

C. sativa Mill. syn. *C. vulgaris* Lam. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 148).

Lupeol and α- and β-amyrins identified in epicuticular leaf wax (*Z. Naturforsch.* 1992, *47C,* 661; *Chem. Abstr.* 1992, *117,* 248572 m).

C. vulgaris Lam.; see *C. sativa* Mill.

CASTANOPSIS (Fagaceae)

C. hystrix DC.; see *C. purpurella* (Miq.) Balak.

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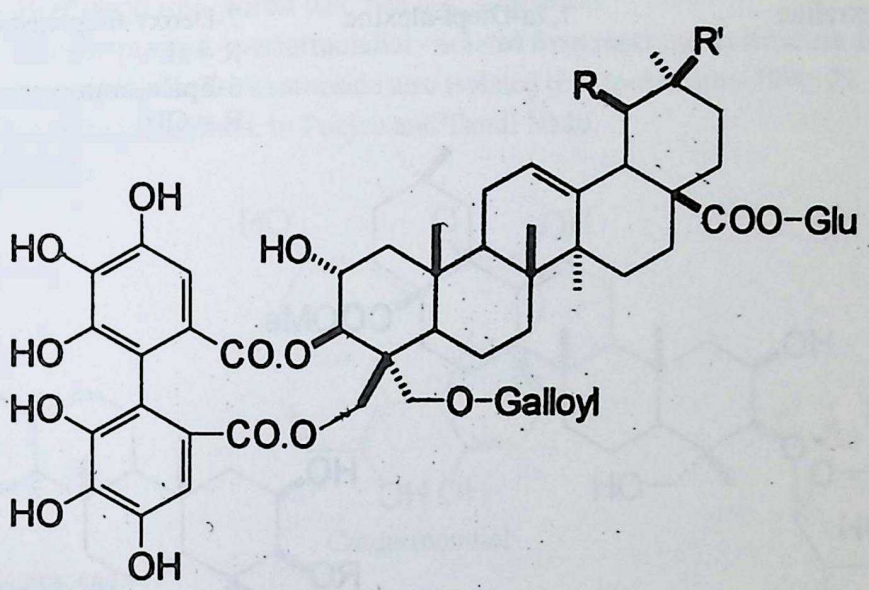
C. purpurella (Miq.) Balak. syn. *C. hystrix* DC.

Assam - Hingori; Khasi - Diebg-stap-dih, Siri kishu; Manipur - Thangji; Mikir - Phongrong-arong; Nep. - Arkhala, Dalinekatus, Katus, Kushuking; Trade - Katus.

A new hydrolysable tannin - castanopsinin I - isolated from leaves along with castanopsinins A, C and E; structure of new compound established as 23-O-gallloyl-3,24-(S)hexahydroxydiphenoyl-2α,3β,23,24-tetrahydroxyolean(urs)-12-en-28-oic acid-28-O-β-D-glucopyranoside (*Phytochemistry* 1993, *32*, 1457).

Distribution; Eastern and north-eastern parts of India, alt. 600 - 2700 m.

NEW COMPOUNDS



Castanopsinin I
R/R' = H/Me or Me/H

CASTANOSPERMUM (Papilionaceae)

C. australe A.Cunn. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995; p. 164).

A new pyrrolizidine alkaloid - 1-epi-australine (1,7a-diepi-alexine) - isolated and its structure elucidated (*Tetrahedron Lett.* 1989, *30*, 5685; *Phytochemistry* 1990, *29*, 111); another alexine - 7,7a-diepi-alexine - also isolated and characterised (*Phytochemistry* 1990, *29*, 111); crystal structure of 6-epicastanospermine determined as (1S,6R,7R,8R,8aR)1,6,7,8-tetrahydroxy-octahydroindolizine by X-ray analysis (*Phytochemistry* 1990, *29*, 1356); 7-deoxy-6-epicastanospermine isolated from seeds and characterised (*J. Nat. Prod.* 1990, *53*, 609); stereoselective synthesis of (+)castanospermine (*J. Am. Chem. Soc.* 1990, *112*, 8100; *Tetrahedron Lett.* 1990, *31*, 4321, 4827; *J. Org. Chem.* 1991, *56*, 2128); isolation of a new triterpenoid saponin from leaves and its characterisation as 2β,23-dihydroxy-3-O-(4-deoxy-β-L-threo-hex-4-enopyranosiduronic acid)-olean-12-en-28-oic acid dimethyl ester (I); medicagenic acid-3-O-β-D-glucopyranoside dimethyl ester also isolated (*Phytochemistry* 1992, *31*, 2805); isolation of

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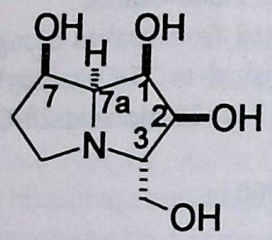
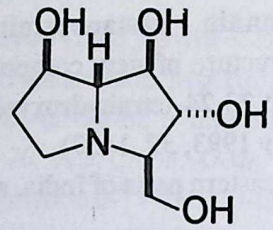
three new triterpenoid saponins - castaralesides F, G and H - from leaves and their structure elucidation (*Chem. Pharm. Bull.* 1994, *42*, 314).

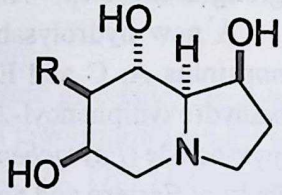
NEW COMPOUNDS



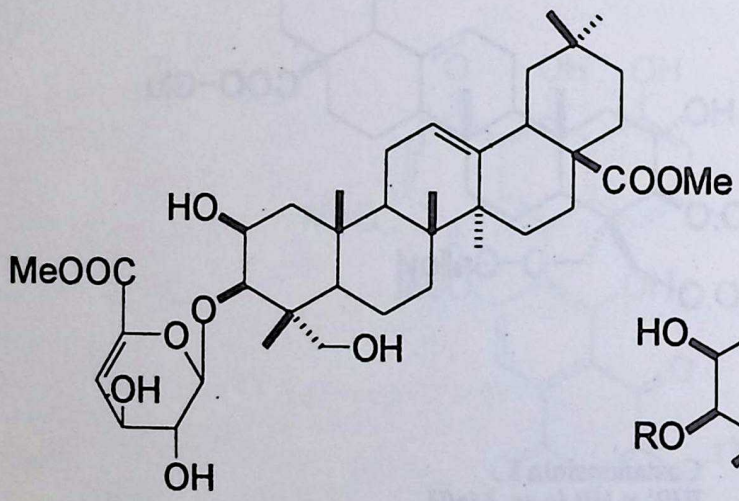
1-Epi-australine



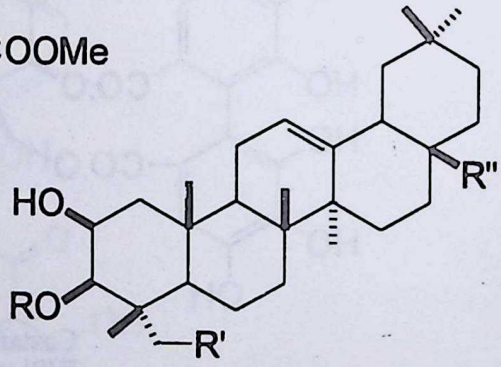
7,7a-Diepi-alexine



7-Deoxy-6-epicastanospermine
R = H
6-Epicastanospermine
R = OH



I



Castaraleside F
R = Gluc.acid(4→1)Gal, R' = OH, R'' = COOH
Castaraleside G
R = Gluc.acid(2→1)Gal(4→1)Rha,
R' = H, R'' = CH_2OH
Castaraleside H
R = Gluc.acid(2→1)Xyl(4→1)Rha,
R' = H, R'' = CH_2OH

BIOLOGICAL ACTIVITY

7-Deoxy-6-epicastanospermine inhibited amyloglucosidase and yeast α-glucosidase but activity less than that of castanospermine, 6-epicastanospermine and australine (*J. Nat. Prod.* 1990, *53*, 609); toxicity and antiviral activity studies of castanospermine *in vitro* and in mice infected with Rauscher murine leukaemia virus carried out. Its IC50 was 9.0 μM. Castanospermine is an active antiviral agent in mice and prolonged oral administration is tolerated (*J. Acquired Immune Defic. Syndr.* 1991, *4*, 48; *Chem. Abstr.* 1991, *115*, 64074 c); castanospermine, p.o., did not appreciably reduce spleen and serum virus titers in Rauscher murine leukaemia virus-infected mice (*Antiviral Chem.* 1991, *2*, 119; *Chem. Abstr.* 1991, *115*, 197822 s).

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CASUARINA (Casuarinaceae)

C. equisetifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 165).

Isolation of β-amyrin and its acetate, taraxerol and its acetate, lupenone, glutinol, lupeol, kaempferol-3α-L-arabinoside, afzelin, gallic acid and β-sitosterol from leaves and fruits (*Bull. Coll. Sci., Univ. Ryukyus* 1987, *45,* 147; *Chem. Abstr.* 1990, *112,* 52179 r).

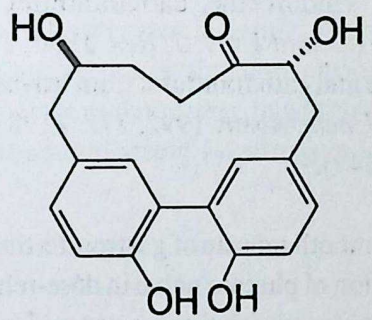
C. junghuhniana Miq.

Eng. - Beef wood tree, Forest oak, Sea oak, Casuarina.

A new diarylheptanoid - casuarinondiol - isolated from roots and its structure established; alnusdiol and lyoniresinol-2α-O-rhamnoside also isolated (*Phytochemistry* 1990, *29,* 3366).

Distribution: Introduced into India, in Punjab and Tamil Nadu.

NEW COMPOUNDS



Casuarinondiol

CATHA (Celastraceae)

C. edulis Forsk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 166).

Cathine and dimer of cathinone isolated from both Egyptian and Yemeni plants whereas norephedrine isolated only from Yemeni plant (*Qatar Univ. Sci. Bull.* 1989, *9,* 55; *Chem. Abstr.* 1990, *113,* 3230 n); absolute configuration at C-9' of cathedulin K-19 and edulinic acid determined as S (*Tetrahedron Lett.* 1993, *34,* 5535).

BIOLOGICAL ACTIVITY

In rats, oral administration of (–)cathinone and (+)amphetamine inhibited formation of gastric lesions produced by various ulcerogenic procedures and cytodestructive agents. Antiulcer effects of cathinone and amphetamine were accompanied by antisecretory effect, since both free and total acidity in treated animals was decreased (*Med. Sci. Res.* 1992, *20,* 817; *Chem. Abstr.* 1993, *118,* 52267 s).

CATHARANTHUS (Apocynaceae)

C. roseus (L.) G.Don syn. *Vinca rosea* L., *Lochnera rosea* (L.) Reichb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 167).

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Oral administration of aqueous fraction of alcoholic extract of leaves markedly lowered blood glucose level in normal and streptozotocin-induced diabetic rats; effect was comparable to that of tolbutamide (*Indian J. Physiol. Pharmacol.* 1991, *35,* 145); leaf extract, unlike insulin, did not affect glucose utilisation and glycogen synthesis by isolated rat hemidiaphragm. Rather, extract at 0.025 g/kg inhibited activity of insulin *in vitro*; mechanism of this inhibition is not clear (*Indian J. Physiol. Pharmacol.* 1992, *36,* 137); leaf extract 0.05-0.40 g/kg showed dose-dependent anti-inflammatory activity (ED50 0.26 g/kg, i.p.) against carrageenin-induced rat hind paw oedema (*Indian J. Physiol. Pharmacol.* 1992, *36,* 191).

A method developed for detection of vindoline, ajmalicine and catharanthine by GC-MS (*J. Chromatogr.* 1990, *505,* 429; *Chem. Abstr.* 1990, *113,* 12225 s); synthesis of vinblastine (Eur. 3,54,778(1990) Feb. 14; *Chem. Abstr.* 1990, *113,* 6663 s); photochemical synthesis of vinblastine and vincristine (*Photochem. Photobiol.* 1990, *51,* 515; *Chem. Abstr.* 1991, *114,* 62462 h); catharanthine synthesised (*Tetrahedron* 1990, *46,* 1711); coronaridine, 11-methoxytabersonine, tetrahydroalstonine, ajmalicine, vindorosine, catharanthine, mitraphylline, vindoline and vinblastine isolated from flowers (*Gomal Univ. J. Res.* 1990, *10,* 27; *Chem. Abstr.* 1992, *117,* 147237 a); extraction of vindoline and catharanthine from leaves by supercritical carbon dioxide (*Biotechnol. Prog.* 1992, *8,* 583; *Chem. Abstr.* 1992, *117,* 219820 k; *Biotechnol. Tech.* 1992, *6,* 127; *Chem. Abstr.* 1992, *117,* 4254 t).

BIOLOGICAL ACTIVITY

Effect of vincristine on smooth muscle of gastrointestinal tract investigated. It inhibited response of diaphragm to stimulation of phrenic nerve in dose-related fashion. Sympathetic nerves more sensitive than somatic nerves to vincristine neurotoxicity (*Med. Sci. Res.* 1991, *19,* 571; *Chem. Abstr.* 1991, *115,* 270119 z); vincristine (75.0 μg/l) *in vitro* was lethal to all the treated 8-cell embryos of mice, but at 12.5 μg/l 75% of those treated developed to morula and blastula stages. Vincristine altered cell nucleus morphology (*Xibao Shengwuxue Zazhi* 1992, *14,* 44; *Chem. Abstr.* 1992, *117,* 225867 x); mature male rats administered vincristine sulphate showed absence of sperm in seminiferous tubules, depletion of germinal epithelial elements and formation of hypertypic giant cells (*Curr. Sci.* 1992, *62,* 535); continuous administration 10.0 to 20.0 μg doses of vincristine per day for 15 days to rats resulted in drastic regression of entire male reproductive system, suggesting that vincristine is toxic to male reproductive system (*Indian J. Exp. Biol.* 1993, *31,* 380); vinblastine increased cell membrane fluidity of SA-1 tumor cells *in vivo* in dose and time-dependent manner; most pronounced effect was observed at 24 to 48 hr post-treatment (*Cancer Lett.* 1994, *79,* 53; *Chem. Abstr.* 1994, *121,* 26450 p).

CEDRUS (Pinaceae)

C. deodara (Roxb. ex D.Don) G.Don syn. *C. libani* Barrel var. *deodara* (Roxb. ex D.Don) Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 170).

A new himachalene isomer - δ-himachalene - along with α-, β- and γ-himachalenes isolated from stem bark and characterised (*J. Chem. Soc. Pak.* 1990, *12,* 282; *Chem. Abstr.* 1991, *115,* 89167 y).

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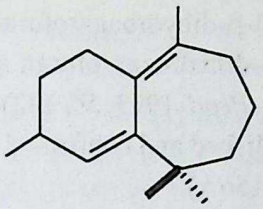
NEW COMPOUNDS



δ–Himachalene

C. libani Barrel var. *deodara* (Roxb. ex D.Don) Hook.f.; see *C. deodara* (Roxb. ex D.Don) G.Don

CEIBA (Bombacaceae)

C. pentandra (L.) Gaertn. syn. *Eriodendron anfractuosum* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 171).

Two new antimicrobial sesquiterpene lactones isolated from root bark and characterised as 2,7-dimethoxy-5-isopropyl-3-methyl-8,1-naphthalene carbolactone and 2-hydroxy-5-isopropyl-7-methoxy-3-methyl-8,1-naphthalene carbolactone; in addition, 8-formyl-7-hydroxy-5-isopropyl-2-methoxy-3-methyl-1,4-naphthoquinone and 7-hydroxycadalene isolated (*J. Nat. Prod.* 1993, *56,* 2041).

CELASTRUS (Celastraceae)

C. hindsii Benth. syn. *C. monosperma* sensu Hook.f. p.p. (non Roxb.), *Monocelastrus monosperma* (Roxb.) Wang & Tang (*monospermus*)

29-Hydroxyfriedelin, 12β-hydroxyfriedelin, friedelin, canophyllal and canophyllalic acid isolated (*Zhongcaoyao* 1993, *24,* 395; *Chem. Abstr.* 1993, *119,* 245576 w).
Distribution: Assam, Arunachal Pradesh, Meghalaya, Nagaland and Skkim.

C. monosperma Roxb.; see *C. hindsii* Benth.

C. paniculatus Willd. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 172).

Root bark chloroform extract showed significant antimalarial activity against *Plasmodium falciparum in vitro* (*Phytother. Res.* 1989, *3,* 136; *Chem. Abstr.* 1990, *112,* 4583 w).

An active principle - pristimerin - isolated from root bark (*Phytother. Res.* 1989, *3,* 136; *Chem. Abstr.* 1990, *112,* 4583 w; *Phytochemistry* 1990, *29,* 3189); in addition, celastrol, zeylasterone and zeylasteral isolated from root bark (*Phytochemistry* 1990, *29,* 3189); two new β-dihydroagarofuran sesquiterpene polyesters - 1β,6α,8α,12-tetraacetoxy-9β-benzoyloxy-β-dihydroagarofuran (I) and 1β,8α,12-triacetoxy-9α-furancarboxy-β-dihydroagarofuran (II) - isolated and characterised (*Phytochemistry* 1991, *30,* 1547); isolation and structure elucidation of another two new sesquiterpene polyesters (III and IV) (*Magn. Reson. Chem.* 1991, *29,* 650; *Chem. Abstr.* 1991, *115,* 110683 a); a new sesquiterpenoid isolated from seed oil and characterised

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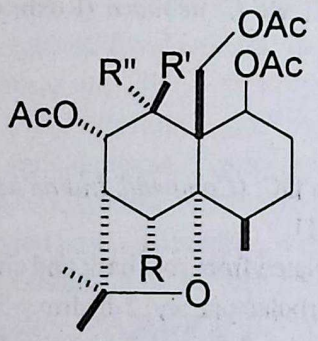
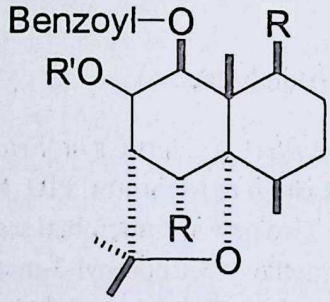
as 1β,6α-diacetoxy-9β-benzoyloxy-8β-cinnamoyloxy-β-dihydroagarofuran (V); 1β,6α,8β-triacetoxy-9α-(β-furancarbonyloxy)-β-dihydroagarofuran also isolated (*J. Nat. Prod.* 1991, *54,* 1383); seed oil yielded four new β-dihydroagarofuran sesquiterpenoids (VI,VII,VIII and IX) whose structures determined (*J. Nat. Prod.* 1993, *56,* 122); 4,4-dimethyl-1,3-dioxan-5-ol isolated from seed oil and its structure established and confirmed by synthesis (*Acta Pharm. Turc.* 1993, *35,* 95; *Chem. Abstr.* 1994, *120,* 50156 x).

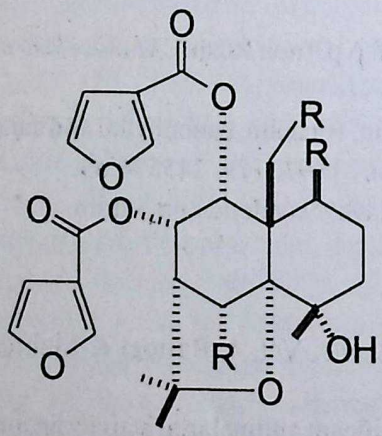
NEW COMPOUNDS



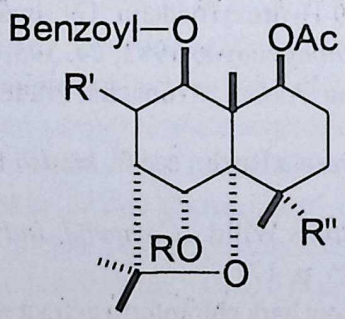
I
R = OAc, R' = Benzoyloxy, R'' = H
II
R,R' = H, R'' = Furancarboxy



III
R = OAc, R' = Ac
V
R = OAc, R' = Cinnamoyl



IV
R = OAc



VI
R = Ac, R' = β-OH, R'' = H
VII
R = Benzoyl, R' = α-OAc, R'' = H
VIII
R = Benzoyl, R' = β-O-Cinnamoyl, R'' = OH
IX
R = Furoyl, R' = β-O-Cinnamoyl, R'' = OH

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CELOSIA (Amaranthaceae)

C. argentea L. var. *argentea* (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 57).

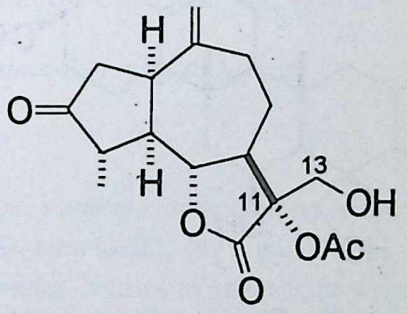
β-Sitosterol, cholesteryl palmitate, 3,5-dihydroxybenzaldehyde, 4-hydroxybenzoic acid, 3,4-dihydroxybenzoic acid, n-butyl-β-D-fructoside and sucrose isolated from seeds (*Zhongcaoyao* 1992, *23,* 344; *Chem. Abstr.* 1993, *118,* 19191 q).

CENTAUREA (Asteraceae)

C. behen L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 157).

Position of acetoxy group in 4β,15-dihydro-3-dehydrosolstitialin A monoacetate (*Phytochemistry* 1982, *21,* 2747) revised to C-11 by X-ray analysis (*Phytochemistry* 1993, *33,* 1267).

NEW COMPOUNDS



4β,15-Dihydro-3-dehydrosolstitialin A acetate

C. calcitrapa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 172).

Two new chalcones - (E)- and (Z)1,3-diphenyl-2-propen-1-ones - along with p-hydroxyacetophenone, matairesinol and arctigenin isolated from aerial parts (*Pharmazie* 1989, *44,* 735; *Chem. Abstr.* 1990, *112,* 155234 j); apigenin-7-glucoside, cyanidin-3-glucoside and cyanidin-3,5-diglucoside isolated from flowers whereas leaves and shoots afforded α-amyrin (*Rev. Latinoam. Quim.* 1991, *22,* 29; *Chem. Abstr.* 1992, *116,* 18399 k, 80477 n); two new germacranolides - 11α,13- and 11β,13-dihydrosalonitenolides - along with cnicin, cnicin-4'-acetate, melitensin and lignans arctigenin, pinoresinol and 7'(S) hydroxyarctigenin isolated from aerial parts (*Phytochemistry* 1992, *31,* 3527).

C. melitensis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 173).

β-Sitosterol, its glucoside, stigmasterol, arctiin and hispidulin isolated from aerial parts (*Plant. Med. Phytother.* 1989, *23,* 293; *Chem. Abstr.* 1991, *114,* 160742 u).

C. picris Pall.; see *Acroptilon repens* (L.) DC.

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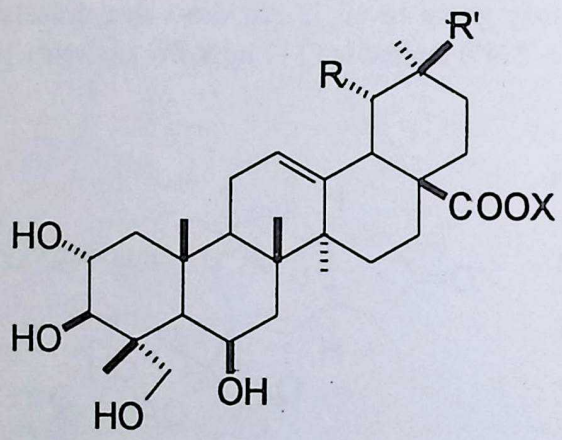
CENTELLA (Apiaceae)

C. asiatica (L.) Urban syn. *Hydrocotyle asiatica* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 173).

Total glycoside fraction from Indian and Mauritian plants compared for antistress activity in rats by measuring their plasma corticosterone levels (PCL) after 1 hr of immobilization stress. Both samples produced significant PCL response, that of Mauritian sample being lower (*Indian Drugs* 1991, *28,* 388).

Two new triterpenoid trisaccharides - asiaticosides A and B - isolated and their structures elucidated (*Phytochemistry* 1989, *28,* 2852).

NEW COMPOUNDS



X = Glu(6→1)Glu(4→1)Rha
Asiaticoside A
R = Me, R' = H
Asiaticoside B
R = H, R' = Me

CENTIPEDA (Asteraceae)

C. minima (L.) A.Br. & Aschers. syn. *C. orbicularis* Lour. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 173).

Ether, methanolic and aqueous extracts exhibited antiallergy activity in passive cutaneous anaphylaxis (PCA) test (*Chem. Pharm. Bull.* 1991, *39,* 3272); plant extract (0.5 g/kg) exhibited antitussive and expectorant activity (*Tap Chi Duoc Hoc* 1994, 10; *Chem. Abstr.* 1994, *121,* 286422 c).

Sitosterol, tetratriacontanyl nonadecanoate, 3,5,3',5'-tetramethoxystilbene, 2-isopropyl-5-methylhydroquinone-4-O-β-D-xylopyranoside, 2α,3β,19α,23-tetrahydroxyurs-12-en-28-oic acid-28-O-β-D-xylopyranoside, 3α,21β,22α,28-tetrahydroxyolean-12-en-28-O-β-D-xylopyranoside and 3β,16α,21β,22α,28-pentahydroxyolean-12-en-28-O-β-D-xylopyranoside

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isolated from whole plant (*Phytochemistry* 1990, *29,* 1945); isolation of 6-hydroxy-hexacos-trans-8-en-3-one, 3,5,4'-trimethoxy-trans-stilbene, 3β,16α,21β,22α,28-pentahydroxyolean-12-ene and its 28-O-xylopyranoside from whole plant (*Indian J. Chem.* 1990, *29*B, 34); quercetin-3-methyl ether, quercetin-3,3'-dimethyl ether, apigenin, aurantiamide acetate, isobutyroylplenolin (arnicolide C) and senecioylplenolin isolated as active component; 2-heptanal, 2,4-heptadienol, isobutyric acid, benzyl alcohol, cis-chrysanthenal, cis-chrysanthenyl acetate, methyl linoleate, β-gurjunene, methyl and ethyl palmitates, 2,4-decadienol, phytol, caryophyllane-2,6β-oxide and dihydroactinidiolide also detected by GC-MS (*Chem. Pharm. Bull.* 1991, *39,* 3272); whole plant contained a triterpenoid saponin (3.11), essential oil (0.11%), coumarin and a sterol (*Tap Chi Duoc Hoc* 1994, 10; *Chem. Abstr.* 1994, *121,* 286422 c).

BIOLOGICAL ACTIVITY

Flavonoids, sesquiterpenes and amide exhibited strong activity in PCA test and significantly inhibited histamine release from rat mast cells. Activity was in the order: apigenin > quercetin-3-methyl ether > quercetin-3,3'-dimethyl ether > isobutyroylplenolin > senecioylplenolin > aurantiamide acetate (*Chem. Pharm. Bull.* 1991, *39*, 3272).

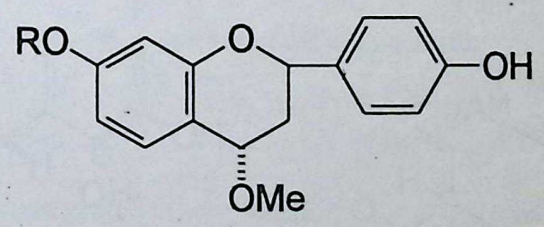
C. orbicularis Lour.; see *C. minima* (L.) A.Br.& Aschers.

CENTRATHERUM (Asteraceae)

C. anthelminticum (L.) Kuntze syn. *Vernonia anthelmintica* Willd. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 170).

Two new flavan glucosides - vernovan and p-hydroxybenzoylvernovan - isolated from seeds and characterised; in addition, vernodalin, vernodalol, butein, 3,4,2',4',5'-pentahydroxy-6'-methoxy-2-methylchalcone, β-amyrin, daucosterol, vernolic acid and stigmasterol isolated (*Huaxue Xuebao* 1991, *49,* 1018; *Chem. Abstr.* 1992, *116,* 148187 a).

NEW COMPOUNDS



Vernovan
R = Glu
p-Hydroxybenzoylvernovan
R = Glu(6-p-hydroxybenzoyl)

CEPHAELIS (Rubiaceae)

C. ipecacuanha (Brot.) A.Rich. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 174).

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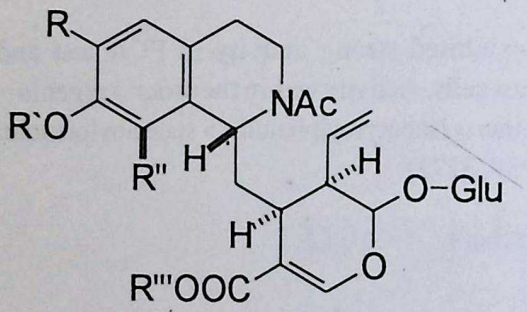
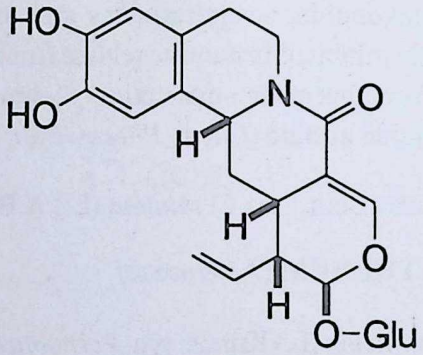
Six new tetrahydroisoquinoline monoterpene glucosides - 6-O-methylipecoside, ipecosidic acid, demethylalangiside, neoipecoside, 7-O-methylneoipecoside and 3,4-dehydroneoipecoside - isolated from roots along with ipecoside, alangiside, sweroside and 7-dehydrologanin; structures of new compounds elucidated (*Phytochemistry* 1991, *30,* 3117); four more monoterpene glucosides - trans-cephaeloside, cis-cephaeloside, 6-O-methyl-trans-cephaeloside and 6-O-methyl-cis-cephaeloside - isolated from roots and their structures established (*Phytochemistry* 1993, *32,* 761); isolation and characterisation of 7-O-methylipecoside and 3-O-demethyl-2-O-methylalangiside from roots along with alangiside (*Phytochemistry* 1994, *36,* 383).

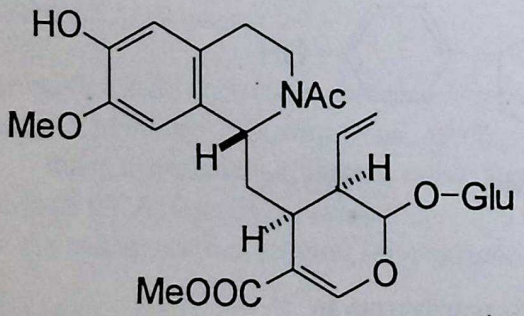
NEW COMPOUNDS



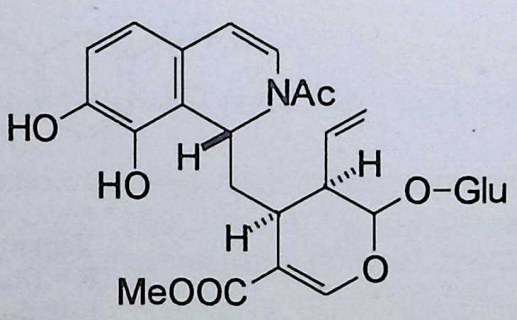
6-O-Methylipecoside
R = OMe, R',R" = H, R''' = Me
Ipecosidic acid
R = OH, R',R",R''' = H
Neoipecoside
R,R' = H, R" = OH, R" = Me
7-O-Methylneoipecoside
R = H, R',R''' = Me, R" = OH



Demethylalangiside



7-O-Methylipecoside



3,4-Dehydroneoipecoside

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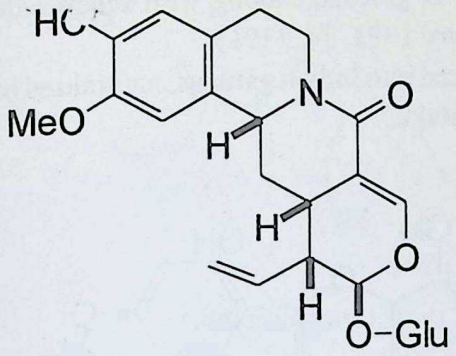
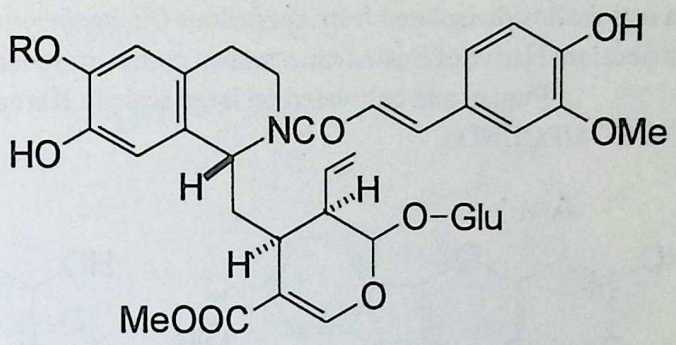
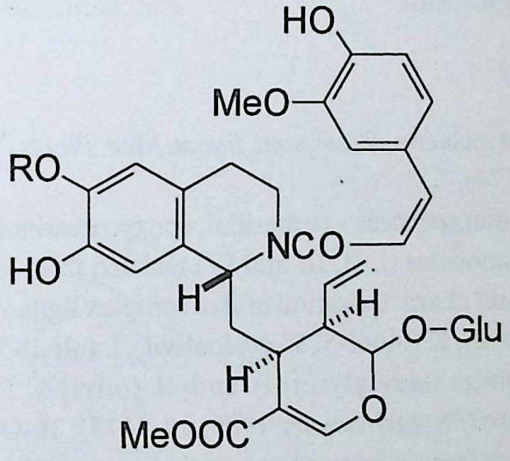


3-O-Demethyl-2-O-methylalangiside



Trans-cephaeloside
R = H
6-O-Methyl-trans-cephaeloside
R = Me



Cis-cephaeloside
R = H
6-O-Methyl-cis-cephaeloside
R = Me

CEPHALANDRA (Cucurbitaceae)

C. indica Naud.; see *Coccinia grandis* (L.) Voigt

CERASUS (Rosaceae)

C. avium Moench; see *Prunus avium* L.

CERATONIA (Caesalpiniaceae)

C. siliqua L.

Eng. - Carob bean tree, Locust bean; Bo. - Meccaniamli; P. - Kharnub.

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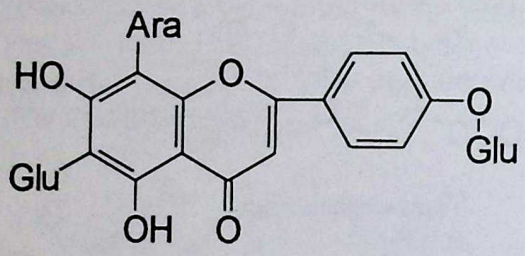
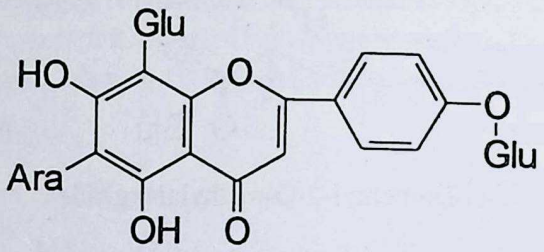
Isoschaftoside-4'-O-glucoside and schaftoside-4'-O-glucoside along with schaftoside and isoschaftoside isolated from cotyledons (*Phytochemistry* 1993, *34*, 1191).

Distribution: Native of East Mediterranean region, introduced into Indian gardens, naturalised in Punjab and cultivated on large scale in Karnataka.

NEW COMPOUNDS



Schaftoside-4'-O-glucoside



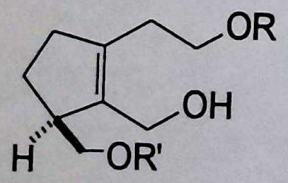
Isoschaftoside-4'-O-glucoside

CERBERA (Apocynaceae)

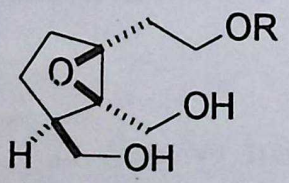
C. manghas L. syn. *C. odollam* Gaertn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 174).

Three new normonoterpenoids - cerberidol, epoxycerberidol and cyclocerberidol - and their four new β-D-allopyranosides (I, II, III and IV) isolated from leaves (*Chem. Pharm. Bull.* 1989, *37*, 2639); isolation and characterisation of five complex lignans - cerberalignans J (olivil-4.O.8"-threo-guaiacylglycerol), K (olivil-5'.5"-cycloolivil), L (olivil-5.5"-cycloolivil), M (olivil-5.5"-olivil-4'''.O.8''''-threo-guaiacylglycerol) and N (olivil-5'.5"-olivil-4'''.O.8''''-threo-guaiacylglycerol) - from stem (*Phytochemistry* 1989, *28*, 3473); 10-O-benzoyltheveside and 10-dehydrogeniposide isolated from leaves along with loganin, theviridoside and theveside (*Phytochemistry* 1990, *29*, 2327).

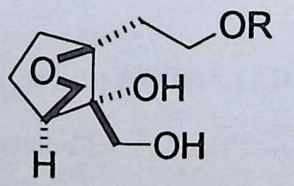
NEW COMPOUNDS



Cerberidol
R,R' = H
I
R = Allose, R' = H
II
R,R' = Allose



Epoxycerberidol
R = H
III
R = Allose



Cyclocerberidol
R = H
IV
R = Allose

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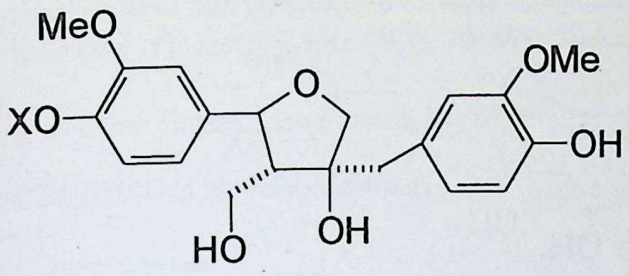
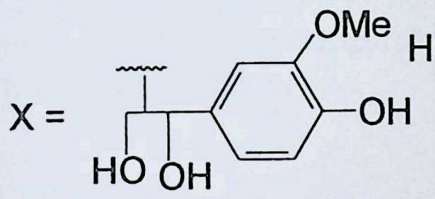
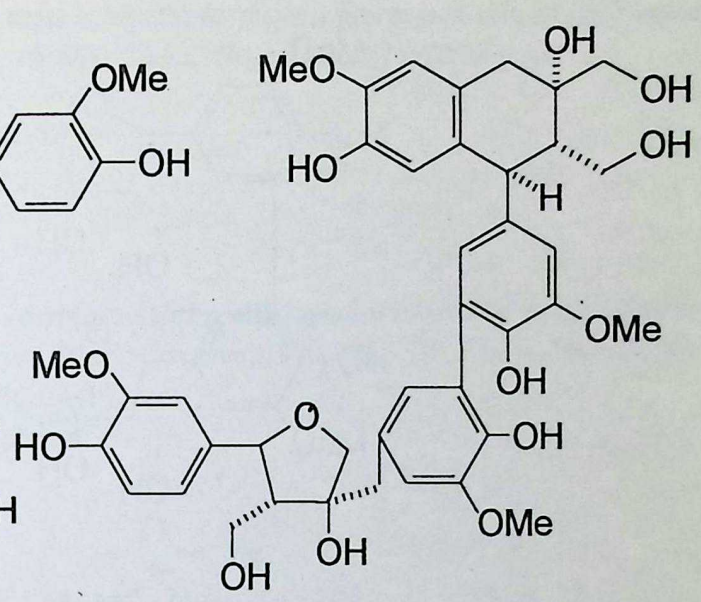
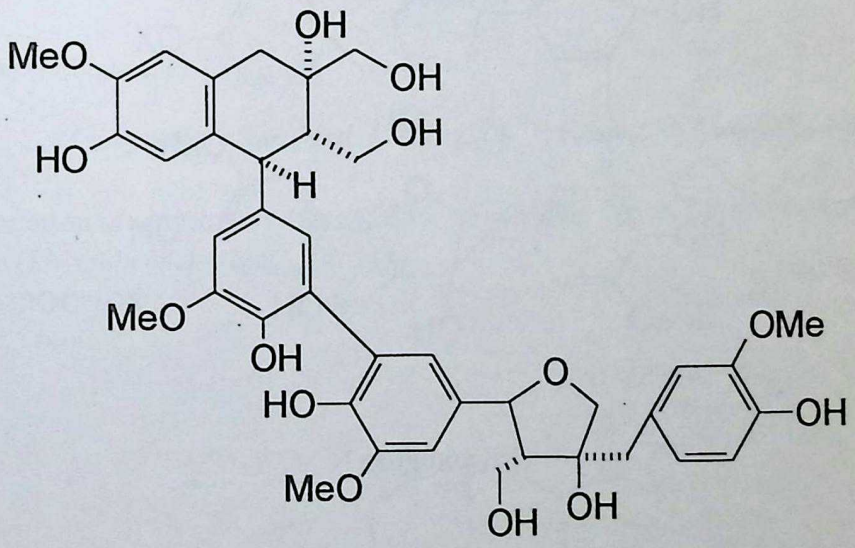


Cerberalignan J





Cerberalignan K



Cerberalignan L

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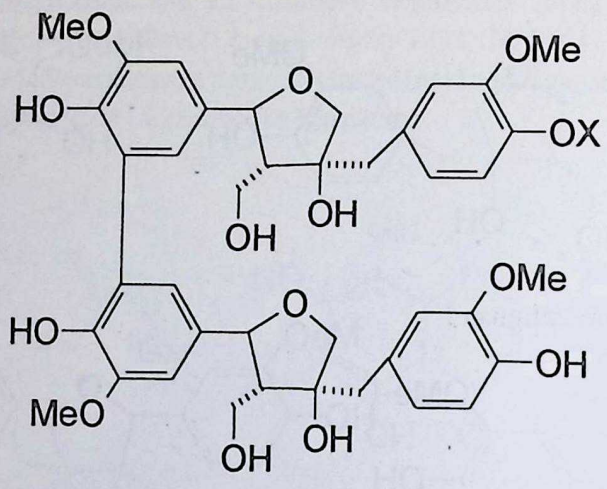
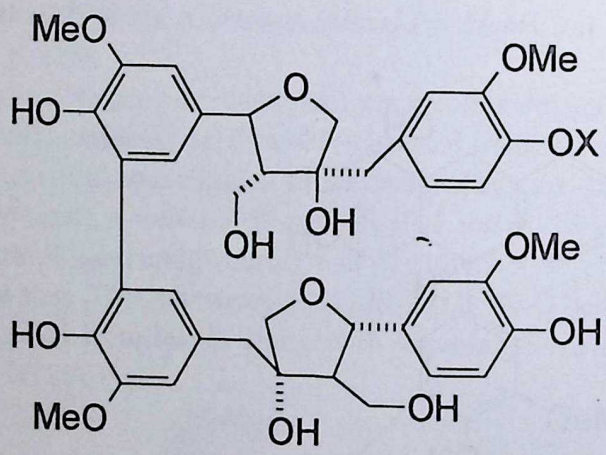
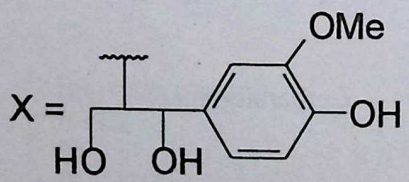


Cerberalignan M



Cerberalignan N



BIOLOGICAL ACTIVITY

Effect of deacetyltanghinin on biosynthesis of thromboxane A2 and prostaglandin PG12 in isolated rabbit heart investigated. Due to opposite effects of these eicosanoids on platelets and

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blood vessels, the equilibrium in their biosynthesis plays a prominent role in cardiovascular haemostasis (*Med. Sci. Res.* 1992, *20*, 667; *Chem. Abstr.* 1992, *117*, 225990 g).

C. odollam Gaertn.; see *C. manghas* L.

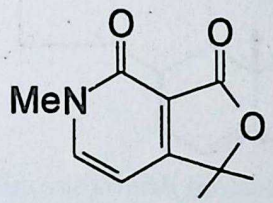
CEROPEGIA (Asclepiadaceae)

C. juncea Roxb.

A new pyridine alkaloid - cerpegin - along with lupeol isolated and its crystal structure determined (*Acta Crystallogr., Cryst. Struct. Commun.* 1990, *46*C, 839; *Chem. Abstr.* 1990, *113*, 152795 c; *Phytochemistry* 1991, *30*, 2449).

Distribution: Peninsular India, in plains.

NEW COMPOUNDS



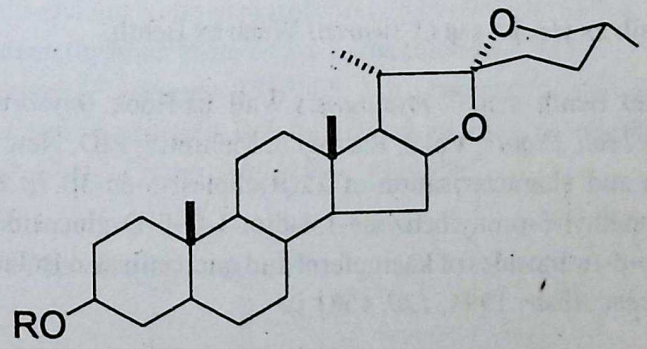
Cerpegin

CESTRUM (Solanaceae)

C. diurnum L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p.97).

Isolation of a new spirostan saponin - diurnoside - from fresh leaves and its structure elucidation (*Phytochemistry* 1993, *34*, 511).

NEW COMPOUNDS



Diurnoside
R = Gal(4→1)Glu[(2→1)Glu(3→1)Glu](3→1)Xyl

C. nocturnum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 178).

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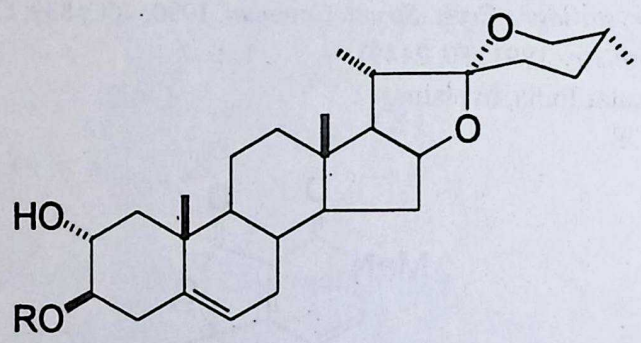
Vietnamese plant during flowering stage contained steroidal saponins in flowers (5.24), leaves (4.50), roots (4.25) and aerial parts (4.11%); tigogenin isolated from aerial parts (*Farmatsiya* 1990, *39*, 25; *Chem. Abstr.* 1990, *113*, 65122 n); a new spirostanol glycoside - nocturnoside A - isolated from leaves and its structure established (*Phytochemistry* 1991, *30*, 3057); leaves afforded two new glucosides - cesternosides A and B - which were characterised as 2-sec.butyl-4,6-dihydroxyphenyl-β-D-glucoside and 2-sec.butyl-4,6-dihydroxyphenyl-6-acetyl-β-D-glucoside respectively (*J. Chem. Res. Synop.* 1994, 22; *Chem. Abstr.* 1994, *120*, 129516 y).

NEW COMPOUNDS



Nocturnoside A
R = Gal(4→1)Glu[(2→1)Glu(3→1)Glu](3→1)Xyl

CHEILANTHES (Cheilanthaceae)

C. chusana Hook.; see *C. swartzii* Webb ex Benth.

C. fragrans (L.f.)Sw. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.179).

Kaempferol-3-(2"-p-coumaroylrhamnosido)-7-rhamnoside isolated from aerial parts (*Phytochemistry* 1992, *31*, 3291).

C. mysurensis Wall. ex Hook.; see *C. swartzii* Webb ex Benth.

C. swartzii Webb ex Benth. syn. *C. mysurensis* Wall. ex Hook. (*mysorensis*), *C. chusana* Hook. (*Compend. Indian Med. Plants*, Vol 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p.174)

Isolation and characterisation of 22(R)cholest-5-en-3β,7β,22-triol-7,22-bis-O-β-D-glucoside and 2-methyl-6-prenylbenzene-1,4-diol-1-O-β-D-glucoside; kaempferol-3-O-β-D-glucoside and 3-O-β-rutinosides of kaempferol and quercetin also isolated (*Shoyakugaku Zasshi* 1993, *47*, 200; *Chem. Abstr.* 1994, *120*, 4581 j).

CHENOPODIUM (Chenopodiaceae)

C. album L. (*Compend. Indian Med. Plants*; Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 162).

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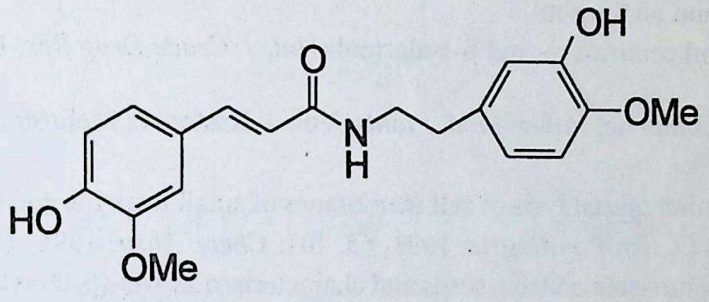
Saponins showed β-haemolysis against buffalo and sheep blood and γ-haemolysis against human blood (*Pakistan Vet. J.* 1990, *10*, 146; *Chem. Abstr.* 1992, *116*, 102686 j).

Plant contained saponins (8.0%) (*Pakistan Vet. J.* 1990, *10*, 146; *Chem. Abstr.* 1992, *116*, 102686 j); isolation of cryptomeridiol and 8α-acetoxycryptomeridiol from seeds (*Fitoterapia* 1991, *62*, 178); a new phenolic amide (I) isolated from roots and its structure determined as N-trans-feruloyl-4-O-methyldopamine and confirmed by synthesis (*Phytochemistry* 1993; *33*, 807).

NEW COMPOUNDS



I

BIOLOGICAL ACTIVITY

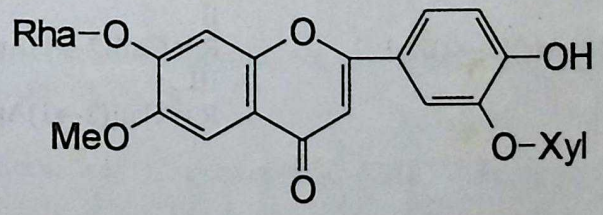
Cryptomeridiol showed significant growth promoting activity (*Fitoterapia* 1991, *62*, 178); phenolic amide (I) at 0.01 μM showed attracting activity toward zoospores of *Aphanomyces cochlioides* (*Phytochemistry* 1993, *33*, 807).

C. ambrosioides L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 162).

Feeding of oil to Egyptian toad, *Bufo regularis*, for 3 months induced neoplasms; hepatocellular carcinomas and metastases of primary liver tumors appeared in kidney of animals (*Oncology* 1992, *49*, 253; *Chem. Abstr.* 1992, *117*, 163405 j).

Isolation of two new flavonol glycosides from fruits and their characterisation as kaempferol-3-O-α-rhamnosido-4'-O-β-xyloside and kaempferol-3-O-α-rhamnosido-7β-xyloside; kaempferol, isorhamnetin and quercetin also isolated (*Phytochemistry* 1990, *29*, 3988); another flavone glycoside - 4-O-demethylabrectorin-7-O-α-L-rhamnosido-3'-O-β-D-xyloside (I) - isolated from fruits and characterised (*Fitoterapia* 1992, *63*, 230); two antifungal monoterpenes - cis-p-mentha-1(7),8-dien-2-ol and ascaridole - isolated (*Biochem. Syst. Ecol.* 1993, *21*, 649; *Chem. Abstr.* 1994, *120*, 4633 c; *Chem. Pharm. Bull.* 1993, *41*, 1309).

NEW COMPOUNDS



I

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BIOLOGICAL ACTIVITY

Ascaridole exhibited analgesic and sedative activities (*Chem. Pharm. Bull.* 1993, *41*, 1309).

C. botrys L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 163).

Essential oil inhibited growth of *Staphylococcus aureus* and *Bacillus subtilis*, respective MICs being 100.0 and 50.0 μg/ml.

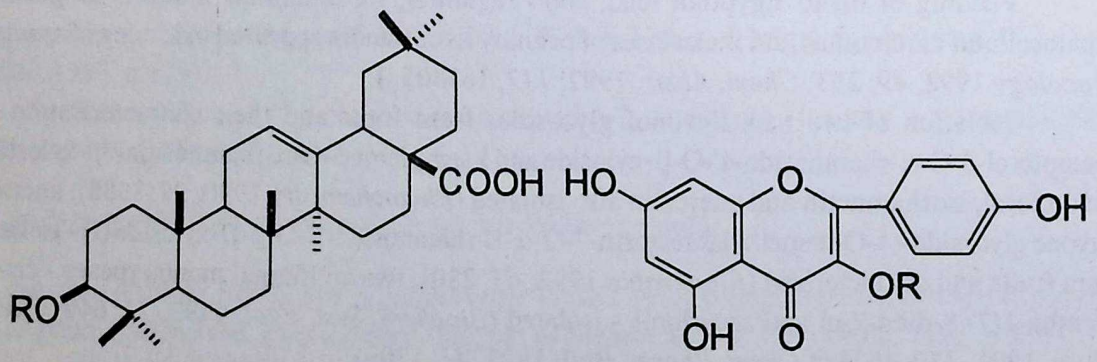
Essential oil cotained α- and β-eudesmols (*Int. J. Crude Drug Res.* 1989, *27*, 185).

C. quinoa Willd. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 179).

Seed saponins caused lysis of cell membranes of small intestine and increased mucosal permeability in rats (*J. Sci. Food Agric.* 1993, *63*, 201; *Chem. Abstr.* 1994, *120*, 29681 e).

A new saponin isolated from seeds and characterised as 3-O-(β-D-xylopyranosyl(1→3)-β-D-glucuronopyranosyl-6-O-methylester)-oleanolic acid (I); oleanolic acid also isolated (*J. Nat. Prod.* 1989, *52*, 1132); a tetraglycoside of hederagenin - quinoside A - isolated from seeds and its structure established (*J. Agric. Food Chem.* 1990, *38*, 205; *Chem. Abstr.* 1990, *112*, 53906 n); isolation and structure elucidation of five new oleanane saponins - quinoa saponins 6, 7, 8, 9 and 10 - isolated along with chikusetsusaponin IVa and quinoside D (*Chem. Pharm. Bull.* 1990, *38*, 375); two kaempferol glycosides (II and III) isolated from seeds and characterised; kaempferol-3-(2",6"-dirhamnosyl)galactoside also isolated (*Phytochemistry* 1990, *29*, 3690).

NEW COMPOUNDS



I
R = Gluc.acid(6-Me)(3→1)Xyl

II
R = Gal[(2→1)Apiofuranose](6→1)Rha

III
R = Gal[(2→1)Apiofuranose

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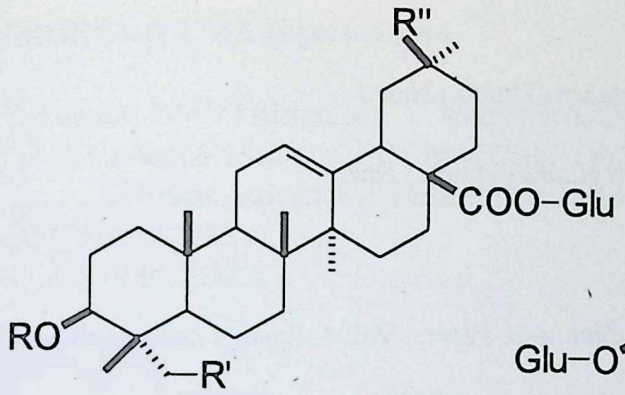

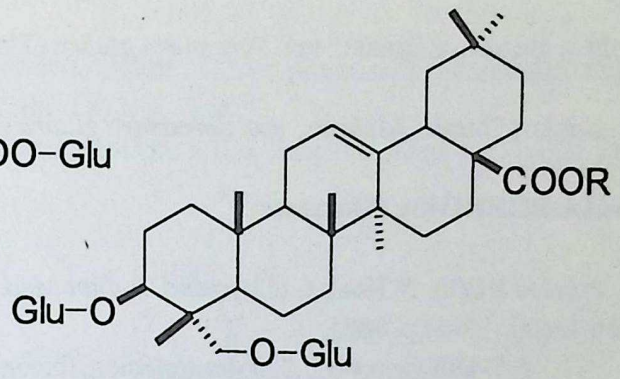

Quinoa saponin 6
R = Ara(3→1)Glu(2→1)Glu, R' = H, R'' = COOMe
Quinoa saponin 7
R = Ara(3→1)Glu(2→1)Glu, R' = H, R'' = Me
Quinoa saponin 8
R = Ara(3→1)Glu(2→1)Glu, R' = OH, R'' = COOMe
Quinoa saponin 9
R = Gluc.acid, R' = OH, R'' = Me
Quinoa saponin 10
R = Gluc.acid(3→1)Xyl, R' = OH, R'' = Me

Quinoside A
R = Ara(3→1)Glu

CHIOCOCCA (Rubiaceae)

C. alba (L.) Hitchcock

Eng. - Snowberry.

Two new hydroxyketones - 4-hydroxyheptadecan-7-one and 5-hydroxyoctadecan-11-one - isolated from leaves along with 5,7,4'-trimethoxy-4-phenylcoumarin, exostemin, matairesinol and D-mannitol (*Phytochemistry* 1991, *30*, 2029); a new triterpenoid isolated from root bark and characterised as 3β-hydroxyolean-12,15-dien-28-oic acid (*Phytochemistry* 1992, *31*, 2546).
Distribution: Introduced into the Indian Botanic Garden, Howrah.

CHISOCHETON (Meliaceae)

C. cumingianus (C.DC.) Harms ssp. *balansae* (C.DC.) Mabberley syn. *C. paniculatus* (Roxb.) Hiern (nom. illeg.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 180).

A new antifungal meliacin - 1,2-dihydro-6α-acetoxyazadirone - isolated and its structure established (*Phytochemistry* 1993, *34*, 583).

C. paniculatus (Roxb.) Hiern; see *C. cumingianus* (C.DC.) Harms ssp. *balansae* (C.DC.) Mabberley

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CHLORANTHUS (Chloranthaceae)

C. brachystachys Blume; see *Sarcandra glabra* (Thunb.) Nakai

C. glaber (Thunb.) Makino; see *Sarcandra glabra* (Thunb.) Nakai

CHLOROPHORA (Moraceae)

C. excelsa Benth. & Hook.f. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 180).

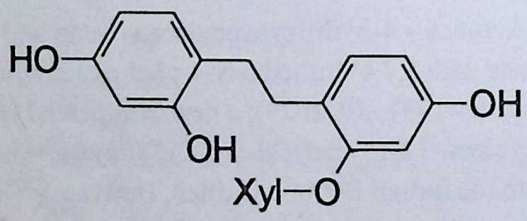
5,5'-Dihydroxy-3,7,2',4'-tetramethoxyflavone isolated from heartwood (*Phytochemistry* 1990, 29, 2741).

CHLOROPHYTUM (Liliaceae)

C. arundinaceum Baker (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 165).

Two new compounds - 4-hydroxy-8,11-oxidoheneicosanol and pentacosyl docosanoate - along with stigmasterol, its glucoside, nonacosane and tetracosanoic and triacontanoic acids isolated from roots (*Phytochemistry* 1992, *31*, 2525); acid hydrolysate of butanol-soluble fraction from roots found to contain stigmasterol, tigogenin, neogitogenin and tokorogenin (*J. Indian Chem. Soc.* 1992, *69*, 893); a new bibenzyl glycoside (I) isolated from roots and characterised as 4,2',4'-trihydroxy-2-xylopyranosyl-bibenzyl (*Phytochemistry* 1993, *32*, 1624).

NEW COMPOUNDS



I

CHOEROSPONDIAS (Anacardiaceae)

C. axillaris (Roxb.) Burtt & Hill syn. *Spondias axillaris* Roxb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 180).

Total flavones (TFC) from fruits (20.16 mg/kg/day, i.p. for 5 days) stimulated cell immunity and humoral immunity in normal mice as well as in cyclophosphamide-immunodepressed mice. TFC caused significant increase in weights of spleen and thymus and also increased production of serum lysozyme in normal mice (*Zhongguo Yaolixue Tongbao* 1991, *7*, 214; *Chem. Abstr.* 1991, *115*, 270264 t).

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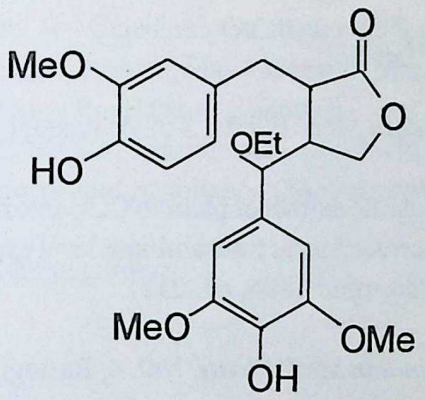
CHONEMORPHA (Apocynaceae)

C. fragrans (Moon) Alston syn. *C. macrophylla* (Roxb.) G.Don (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 166).

A lignan derivative (I) isolated from stem (Jpn. 5,194,464 (1991) Sep. 25; *Chem. Abstr.* 1993, *119*, 167720 x).

NEW COMPOUNDS



I

BIOLOGICAL ACTIVITY

Lignan derivative (I) at 40.0 μg/ml accelerated uptake of low density lipoprotein by Hep G2 cell by 67.0% (Jpn. 5,194,464(1991) Sep. 25; *Chem. Abstr.* 1993, *119*, 167720 x).

C. macrophylla (Roxb.) G.Don; see *C. fragrans* (Moon) Alston

CHRISTELLA (Thelypteridaceae)

C. dentata (Forssk.) Brownsey & Jermy

Eng. - Downy wood fern, Oak fern.

Isolation of protocatechuic, caffeic and p-coumaric acids (*Indian J. Plant Physiol.* 1992, *35*, 275; *Chem. Abstr.* 1993, *119*, 113341 f).

Distribution: Throughout hilly regions of India, ascending to 1800 m.

CHROMOLAENA (Asteraceae)

C. odorata (L.) King & Robinson; see *Eupatorium odoratum* L.

CHROZOPHORA (Euphorbiaceae)

C. obliqua (Vahl) A. Juss. ex Spreng.; see *C. tinctoria* (L.) Rafin.

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C. tinctoria (L.) Rafin. syn. *C. obliqua* (Vahl) A. Juss. ex Spreng. [sensu Hook.f., p.p.], *C. verbascifolia* (Willd.) A. Juss. ex Spreng.

Lupeol, stigmasterol, β-sitosterol and its glucoside isolated from unsaponifiable fraction of alcoholic extract of aerial parts (*Zagazig J. Pharm. Sci.* 1994, *3,* 72; *Chem. Abstr.* 1994, *121,* 238200 g).

Distribution: North-west India.

C. verbascifolia (Willd.) A. Juss. ex Spreng.; see *C. tinctoria* (L.) Rafin.

CHRYSANTHEMUM (Asteraceae)

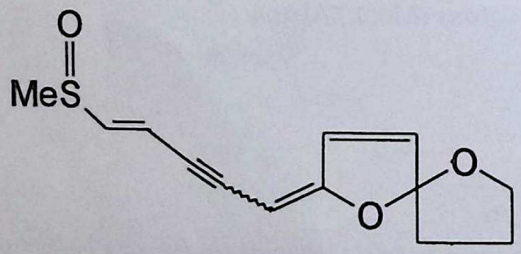
C. balsamita L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 181).

Administration of alcoholic extract of plant to CCl_4-intoxicated rats for 7 days decreased liver steatosis and markedly increased seric transaminase level especially GPT which indicates a process of hepatocytolysis (*Fitoterapia* 1994, *65,* 211).

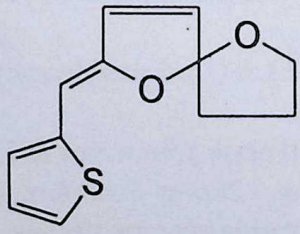
C. coronarium L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 181).

Two new stereoisomeric acetylenic sulphoxides and one new thiophene spiroacetal enol ether isolated from aerial parts and characterised as 2-[(1E,4E)- and 2-[(1Z,4E) 5-methylsulphinyl-2-pentyn-4-enyliden]-1,6-dioxaspiro[4,4]non-3-enes (I and II) and 2-[(Z)2-thienylmethylene]-1,6-dioxaspiro[4,4]non-3-ene (III) respectively (*Ann. Chem.* 1990, 303).

NEW COMPOUNDS



I 6(E)
II 6(Z)



III

C. indicum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 182).

α-, β-Amyrins, lupeol, ψ-taraxasterol and sitosterol isolated from plant absolute (*Dokl. Bolg. Akad. Nauk* 1989, *42,* 39; *Chem. Abstr.* 1990, *112,* 83832 c); determination of camphor (16.0), trans-carane-trans-2-ol (15.0), bornyl acetate (12.0) and sabinene (7.0%) in flower essential oil by GC-MS (*Linchan Huaxue Yu Gongye* 1992, *12,* 159; *Chem. Abstr.* 1993, *119,* 34075 u); a new sesquiterpene - chrysantherol - isolated from flowers and its structure elucidated (*Chinese Chem. Lett.* 1993, *4,* 893; *Chem. Abstr.* 1994, *121,* 78247 x).

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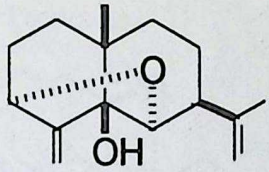
NEW COMPOUNDS



Chrysantherol

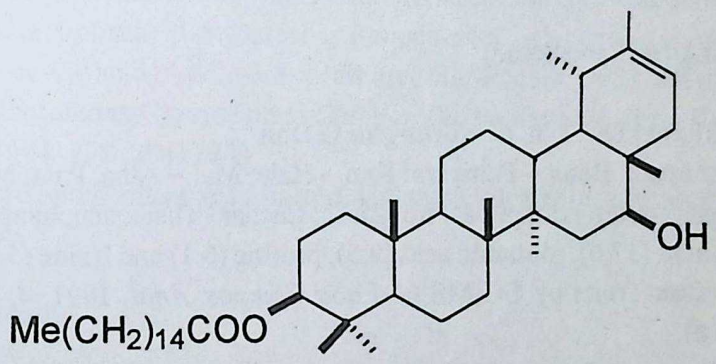
C. morifolium Ramat.

Eng. - Chrysanthemum; H. - Guledauri, Guledawoodi; S. - Bahupatrika; Kan. - Sevantige; Tam. - Akkarakarm, Jevanthi, Saamanthipoo; Mal. - Jevanthi; Mar. - Shevati; Tel. - Çhamantipuru; Bo. - Akurkura; Ladakh - Kalzang; P. - Bagaur, Bhanwiri.

A new triterpenoid (I) isolated from flowers along with four quinic acid caffeates and two flavonoids; structure of triterpenoid established (*Shoyakugaku Zasshi* 1990, *44,* 335; *Chem. Abstr.* 1991, *115,* 25989 k).

Distribution: Introduced into Indian gardens.

NEW COMPOUNDS



I

Note : The garden forms of *Chrysanthemum* have mainly arisen from *C. morifolium* Ramat. and *C. indicum* L. and large scale hybridisation followed by preferential selection has resulted in numerous cultivars of complex origin. For more details see *Wealth of India - Raw Materials*,Vol. 3 (Ca-Ci p. 513-516) (Revised edition 1992).

CHRYSOBALANUS (Chrysobalanaceae)

C. icaco L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 63).

Plant extracts exhibited activity against AIDS virus.

Two diterpenes (I and II) isolated (*Tetrahedron* 1991, *47,* 4547).

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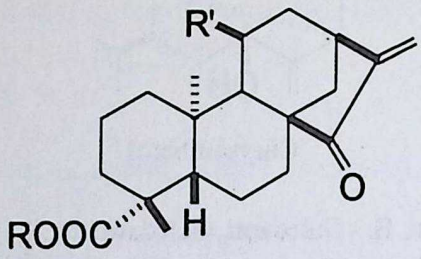

I
R,R'= H
II
R = Me, R' = OH

BIOLOGICAL ACTIVITY

Diterpene (I) exhibited anti-HIV activity (*Tetrahedron* 1991, *47*, 4547).

CHRYSOPHYLLUM (Sapotaceae)

C. lanceolatum (Blume) DC. syn. *C. roxburghii* G.Don

Eng. - Star apple; Beng. - Petakara; Kan. - Hale; Mal. - Atha, Pala; Mar. - Tarsi; Tam. - Kappalei, Kattillupai; Assam - Bonpitha, Pithogarkh; Cachar - Thaibonbuphang; Kuki - Theipabon.

Aspartic acid (37.6), glutamic acid (9.5), proline (6.1) and lysine (5.4%) determined in total amino acids from fruits by GC-MS (*J. Food Compos. Anal.* 1991, *4*, 354; *Chem. Abstr.* 1992, *116*, 82460 a).

Distribution: North-east India upto 1200 m.

C. roxburghii G. Don; see *C. lanceolatum* (Blume) DC.

CHRYSOPOGON (Poaceae)

C. aciculatus (Retz.) Trin.

H. - Lampa, Kawakheti, Sikola, Senerakhurd, Surwala; Beng. - Chorkanta; Kan. - Ganjigarikehullu; Tam. - Tulliri; Tel. - Puthigaddi; Khasi - Samask.

A new flavone-C-glycoside - aciculatin - isolated from plant collected from Phillippines and its structure elucidated (*Tetrahedron* 1991, *47*, 1815).

Distribution: Throughout India, ascending to 2200 m and in Andman and Nicobar Islands.

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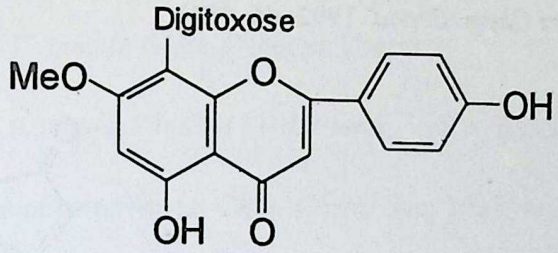

Aciculatin

BIOLOGICAL ACTIVITY

Aciculatin was cytotoxic to KB cells, but toxicity was reduced on addition of exogenous calf thymus DNA to cells (*Tetrahedron* 1991, *47,* 1815).

CHUKRASIA (CHICKRASSIA) (Meliaceae)

C. tabularis A. Juss. var. *velutina* (Wall.) King

Hexadecanoic, tetracosanoic, hexacosanoic, nonacosanoic and dotriacontanoic acids, heneicosane, dotriacontane, β-sitosterol, daucosterol, glycerol-1-hexadecanoate, 16-hydroxyhexadec-9-en-oic acid (9-dehydro-isoambrettolic acid) and glycerol-1-octadec-9(Z)-en-oate-3-glucoside identified in Chinese plant (*Yunnan Daxue Xuebao, Ziran Kexueban* 1992, *14,* 51; *Chem. Abstr.* 1994, *120,* 294179 y).

Distribution: Eastern and peninsular India and Andaman Islands in hilly regions, alt. 1000 - 1500 m.

CICER (Papilionaceae)

C. arietinum L. (*Compend. Indian. Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 184).

24-Epiclerosterol, 24α- and 24β-methyl-5α-cholest-8(14)-en-3β-ols, 24α-ethyl-5α-cholest-8(14)-en-3β-ol, 14α,24α- and 14α,24β-dimethyl-5α-cholest-9(11)-en-3β-ols, 14α-methyl-24α-ethyl-5α-cholest-9(11)-en-3β-ol and 14α-methyl-24β-ethyl-5α-cholesta-9(11),25-dien-3β-ol and β-sitosterol identified in seeds (*Phytochemistry* 1992, *31,* 1765).

CICHORIUM (Asteraceae)

C. intybus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 184).

A new sesquiterpene lactone - 11,13-dihydrolactucopicrin - isolated from roots and its structure established (*J. Agric. Food Chem.* 1990, *38,* 1035; *Chem. Abstr.* 1990, *112,* 177202 z); pontica epoxide isolated from underground parts and its structure determined; another

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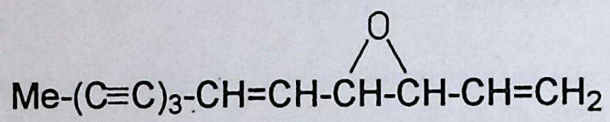
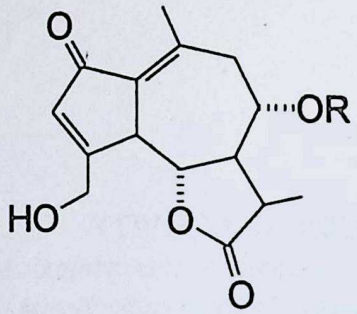
polyacetylene compound also isolated and partially characterised (*Planta Med.* 1991, *57*, 97); synthesis of apigenin (*Acta Chem. Scand.* 1992, *46*, 494).

NEW COMPOUNDS



Pontica epoxide



11,13-Dihydrolactucopicrin
R = 4-Hydroxyphenylacetyl

BIOLOGICAL ACTIVITY

Quercitrin (0.05, 0.1 and 0.2 g/kg, orally) inhibited rat hind paw oedema induced by carrageenan, dextran, histamine, serotonin and bradykinin in a dose-dependent manner (*Yakugaku Zasshi* 1993, *113*, 327; *Chem. Abstr.* 1993, *119*, 108604 q).

CIMICIFUGA (Ranunculaceae)

C. foetida L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 64).

A new trinor-triterpenoid - foetidinol - isolated from rhizome and its structure determined (*Tetrahedron Lett.* 1994, *35*, 4575); isolation and structure elucidation of a new cycloartane triterpenoid - (23R,24S)25-anhydrocimigenol-3-O-β-D-xylopyranoside - from rhizomes; (23R,24S)cimigenol-3-O-β-D-xylopyranoside, (23R,24S)25-O-acetylcimigenol-3-O-β-D-xylopyranoside, actein and 27-deoxyactein also isolated (*Yaoxue Xuebao* 1994, *29*, 449; *Chem. Abstr.* 1994, *121*, 200936 p).

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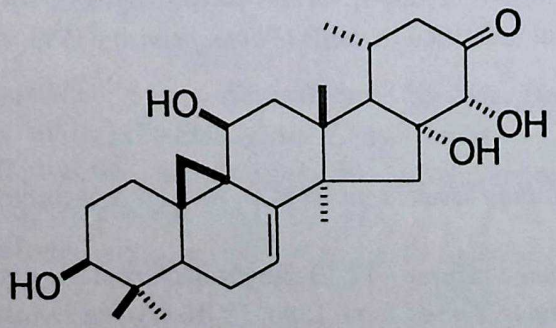

Foetidinol

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CINNAMOMUM (Lauraceae)

C. albiflorum Nees; see *C. tamala* (Ham.) Nees ex Eberm.

C. camphora (L.) Sieb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 170).

Total synthesis of camphor (*J. Chin. Chem. Soc.* 1993, *40,* 379; *Chem. Abstr.* 1994, *120,* 245530 x).

C. cecidodaphne Meissn.; see *C. glaucescens* (Nees ex Wall.) Drury

C. glaucescens (Nees ex Wall.) Drury syn. *C. cecidodaphne* Meissn.

Assam - Gonsorai; Cachar - Gondroiphang; Garo - Gamsalu; Khasi - Diend-pingwait, Lanyar-iong; Lepcha - Rohun-kung; Lushai - Saper; Manipur - Gonoroi; Mikir - Suri-arong; Nagaland - Thansang; Nep. - Mallagiri.

Fruit oil contained methyl cinnamate, thymol, safrole, cineole, eugenol, linalool, linalyl acetate and nerol (*Indian Perfum.* 1988, *32,* 295; *Chem. Abstr.* 1990, *113,* 11911 a); methyl cinnamate (14.0), 1,8-cineole (13.0) and α-terpineol (7.0%) determined in fruit (including seed) oil of Nepalese plants by GC-MS whereas pericarp oil contained 1,8-cineole (56.0) and α-terpineol (10.0%) (*J. Essent. Oil Res.* 1992, *4,* 151; *Chem. Abstr.* 1993, *118,* 209418 s).

Distribution : Sikkim, West Bengal, Assam, Meghalaya, Manipur and Mizoram, ascending to 1300 m.

C. impressinervium Meissn. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 65).

Eugenol (83.2%) determined in leaf essential oil (*J. Essent. Oil Res.* 1994, *6,* 211; *Chem. Abstr.* 1994, *121,* 132588 z).

C. parthenoxylon (Jack) Meissn. syn. *C. porrectum* (Roxb.) Kosterm. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 185).

Methyl eugenol (45.0) and safrole (20.0%) determined in wood oil (1.0%) of Malaysian plant by GC-MS (*J. Essent. Oil Res.* 1990, *2,* 51; *Chem. Abstr.* 1990, *113,* 120593 u).

C. porrectum (Roxb.) Kosterm.; see *C. parthenoxylon* (Jack) Meissn.

C. sulphuratum Nees

Linalool (92.66), geraniol (2.2) and citronellol (1.47%) determined in leaf oil by GC-MS (*J. Essent. Oil Res.* 1994, *6,* 77; *Chem. Abstr.* 1994, *121,* 78291 g).

Distribution: Nilgiri Hills.

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C. tamala (Ham.) Nees & Eberm. syn. *C. albiflorum* Nees (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 171).

Linalool (54.66), α-pinene (9.67), p-cymene (6.43), β-pinene (4.45) and limonene (2.64%) determined in leaf oil of Nepalese plant by GC-MS (*Nippon Shokuhin Kogyo Gakkaishi* 1994, *41,* 512; *Chem. Abstr.* 1994, *121,* 129997 b); determination of eugenol (37.0), 1,8-cineole (29.2), geraniol (8.7), α-terpineol (7.5) and terpinen-4-ol (7.3%) in wood oil of plant from kampuchea (*J. Essent. Oil Res.* 1994, *6,* 201; *Chem. Abstr.* 1994, *121,* 78287 k).

C. verum J.S. Presl syn. *C. zeylanicum* Blume (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 185).

β-Caryophyllene, trans-cinnamyl acetate, trans-cinnamyl alcohol, eugenol, hydroxycinnamaldehyde and salicylaldehyde identified in bark and leaf essential oil by GC-MS (*Dev. Food Sci.* 1994, *34,* 411; *Chem. Abstr.* 1994, *121,* 81384 v).

C. zeylanicum Blume; see *C. verum* J.S. Presl

CIRRHOPETALUM (Orchidaceae)

C. andersonii Hook.f.; see *Bulbophyllum andersonii* (Hook.f.) J.J. Schult.

C. maculosum Lindl.; see *Bulbophyllum umbelatum* Lindl.

CIRSIUM (Asteraceae)

C. arvense (L.) Scop. syn. *Cnicus arvensis* Hoffm. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 186).

Two new aplotaxene derivatives isolated from roots and characterised as 8,9-epoxy-heptadeca-1,11,14-triene and 8,9-dihydroxyheptadeca-1,11,14-triene (*Phytochemistry* 1992, *31,* 1033).

CISSAMPELOS (Menispermaceae)

C. pareira L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 186).

Isolation of laudanosine, nuciferine, bulbocapnine, corytuberine and magnoflorine (*Fitoterapia* 1992, *63,* 282); a new antileukaemic tropoloisoquinoline alkaloid - pareirubrine - isolated and its structure established by X-ray analysis (*Chem. Lett.* 1993, 2339; *Chem. Abstr.* 1993, *118,* 187838 z); isolation and structure elucidation of two azafluoranthene alkaloids - norimeluteine and norruffscine (*Chem. Pharm. Bull.* 1993, *41,* 1307); pareirubrines A (earlier designated as pareirubrine) and B isolated as antileukaemic compounds and their structures

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determined by X-ray analysis; grandirubrine and isomerubrine also isolated (*Chem. Pharm. Bull.* 1993, *41,* 1418).

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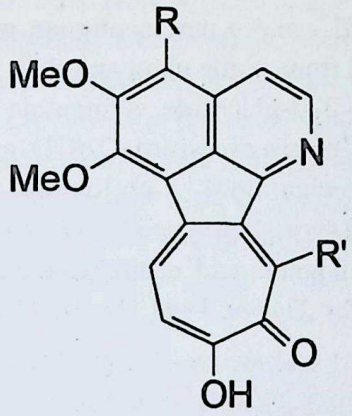
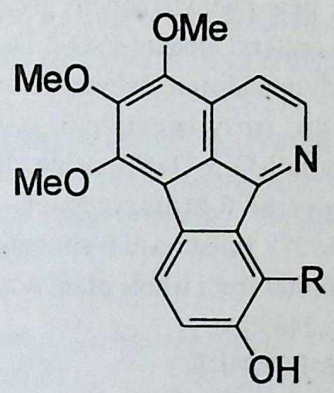


Pareirubrine A
R,R' = OMe
Pareirubrine B
R,R' = H



Norimeluteine
R = OMe
Norruffscine
R = H

BIOLOGICAL ACTIVITY

Norimeluteine (3.6 μg/ml) and norruffscine (5.8 μg/ml) showed cytotoxic activity against P-388 cells (*Chem. Pharm. Bull.* 1993, *41,* 1307).

CISSUS (Vitaceae)

C. quadrangularis L. syn. *Vitis quadrangularis* Wall. ex Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 173).

A new unsymmetrical triterpenoid - 7-oxo-onocer-8-ene-3β,21α-diol (I) - isolated and its structure established (*Phytochemistry* 1990, *29,* 336); 4-hydroxy-2-methyltricos-2-en-22-one, 9-methyl-octadec-9-ene, heptadecyl octadecanoate, icosanyl icosanoate, 31-methyltritriacontan-1-ol, 7-hydroxy-20-oxodocosanylcyclohexane and 31-methyl-tritriacontanoic acid isolated and their structures elucidated; taraxeryl acetate, friedelan-3-one, taraxerol, β-sitosterol and isopentacosanoic acid also isolated (*Phytochemistry* 1991, *30,* 875)

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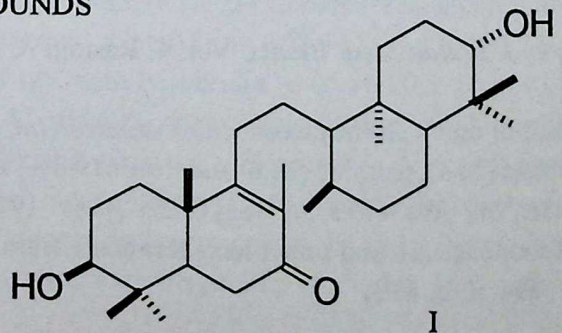

I

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CISTANCHE (Orobancaceae)

C. tubulosa (Schrenk) Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 187).

A new phenylethanoid glycoside - tubuloside E - and a new neolignan glycoside - dehydrodiconiferyl alcohol-γ'-O-β-D-glucoside - isolated from whole plant and their structures determined; in addition, dehydrodiconiferyl alcohol-4-O-β-D-glucoside, syringalide A-3'-α-L-rhamnoside, isosyringalide-3'-α-L-rhamnoside, (+)syringaresinol-O-β-D-glucoside, (+)pinoresinol-O-β-D-glucoside, liriodendrin, 6-deoxycatalpol, 8-epiloganic acid, 20-hydroxyecdysone, 8-hydroxygeraniol-1β-D-glucoside and syringin isolated (*Chem. Pharm. Bull.* 1990, *38,* 1927); isolation of β-sitosterol, daucosterol, 8-epiloganic acid, echinacoside, cistanoside A and mannitol from whole plant (*Zhongguo Yaoke Daxue Xuebao* 1993, *24,* 46; *Chem. Abstr.* 1993, *119,* 24639 s).

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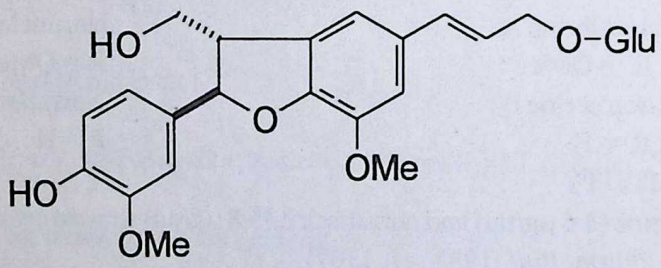
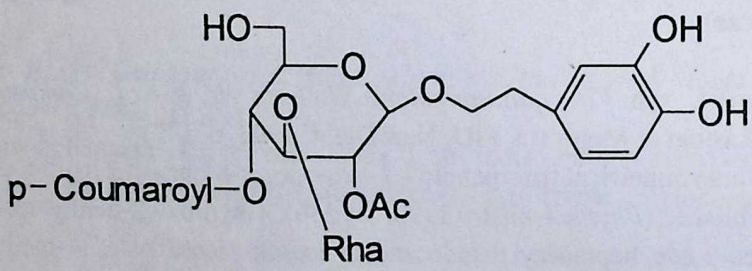


Dehydrodiconiferyl alcohol-γ'-O-β-D-glucoside



Tubuloside E

CITRULLUS (Cucurbitaceae)

C. colocynthis (L.) Schrad. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 188).

Hentriacontane, n-octacosanol and 1,26-hexacosanediol isolated (*Int. J. Crude Drug Res.* 1990, *28,* 183); linoleic (51.3), oleic (24.1), palmitic (12.8) and stearic (9.8%) acids determined in seed oil by GC-MS (*Pakistan J. Sci. Ind. Res.* 1993, *36,* 383; *Chem. Abstr.* 1994, *121,* 279352 b); isolation of 1,11-undecanediol monoacetate and nonyl hexadecanoate from roots and their characterisation (*Indian J. Chem.* 1994, *33*B, 897).

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CITRUS (Rutaceae)

C. aurantifolia (Christm.) Swingle syn. *C. medica* L. var. *acida* Hook.f. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 175).

Aqueous and alcoholic extracts of roots inhibited growth of *Staphylococcus aureus, Klebsiella pneumoniae, Proteus mirabilis, Pseudomonas aeruginosa, Escherichia coli and Neisseria gonorrhoeae* (*J. Appl. Bacteriol.* 1991, *71,* 398; *Chem. Abstr.* 1992, *116,* 91208 b).

Limonene, geranial, nerol and β-pinene identified in leaf oil of Nigerian plant by GC-MS (*J. Essent. Oil Res.* 1991, *3,* 119; *Chem. Abstr.* 1991, *114,* 253824 n); identification of palmitic, oleic, linoleic, stearic and linolenic acids in seed oil (*Food Chem.* 1993, *47,* 77; *Chem. Abstr.* 1993, *118,* 232624 q).

C. aurantium L. syn. *C. aurantium* L. var. *bigaradia* Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 189).

Fruit alkaloids markedly increased blood pressure and flavonoids inhibited contractions of isolated intestine. Essential oil significantly decreased rate and frequency of writhing syndrome induced by i.p. acetic acid and spontaneous locomotor activity in mice (*Zhongcaoyao* 1994, *25,* 419; *Chem. Abstr.* 1994, *121,* 292018 s).

17β-D-glucosides of limonin, obacunone, deacetylnomilin, nomilin, deacetylnomilinic acid, nomilinic acid, isolimonic acid, ichangin and 19-hydroxy-deacetylnomilinic acid isolated from seeds (*Phytochemistry* 1991, *30,* 3803); synephrine and N-methyltyramine identified by HPLC (*Chem. Pharm. Bull.* 1992, *40,* 3284); neodiosmin isolated from leaves and characterised as 5,7,3'-trihydroxy-4'-methoxyflavone-7β-neohesperidoside (*Phytochemistry* 1992, *31,* 723); determination of limonin (0.24), deacetylnomilin (0.08), nomilin (0.02), ichangin (0.01), deacetylnomilic acid (0.01), isolimonic acid (0.01), obacunone (0.003) and nomilinic acid (0.002%) in seeds; 17β-D-glucopyranosides of deacetylnomilin (52.5) and deacetylnomilinic acid (19.0%) present in total limonoid glucosides (0.73%) of seeds (*Nippon Nogei Kagaku Kaishi* 1992, *66,* 31; *Chem. Abstr.* 1992, *116,* 231904 c); palmitic, oleic, linoleic, stearic and linolenic acids identified in seed oil (*Food Chem.* 1993, *47,* 77; *Chem. Abstr.* 1993, *118,* 232624 q).

BIOLOGICAL ACTIVITY

Naringin and naringenin selectively inhibited growth of cancer cells and may be used in the treatment of cancers resistant to chemo- and radio-therapy. Naringin strongly inhibited DNA formation *in vitro* in human cancer tissues (breast, colon and liver), but not in normal human tissues (bone marrow, spleen) (Eur. 352,147 (1990) Jan. 24; *Chem. Abstr.* 1990, *113,* 91455 t); pretreatment of rats with hesperidin (0.05 and 0.1 g/kg, s.c.) reduced paw oedema induced by carrageenin by 47 and 63% respectively within 5 hr. This effect was equivalent to that produced by indomethacin (0.1 g/kg, p.o.). Hesperidin (0.1 g/kg) decreased rat paw oedema induced by dextran by 33%. It also inhibited pleurisy induced by carrageenin, reducing the volume of exudate and number of migrating leucocytes by 48 and 34% respectively compared to control values. Pretreatment of mice with hesperidin (0.1 g/kg, s.c.) reduced acetic acid-induced abdominal

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constriction by 50%, but did not affect tail flick response. Hyperthermia induced by yeast in rats was slightly reduced by hesperidin (*J. Pharm. Pharmacol.* 1994, *46,* 118).

C. aurantium L. var. *bigaradia* Hook.f.; see *C. aurantium* L.

C. decumana L.; see *C. grandis* (L.) Osbeck

C. grandis (L.) Osbeck syn. *C. maxima* (Burm.) Merr., *C. decumana* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 190).

Determination of (+) limonene (95.0%) in fruit essential oil by GC-MS (*Zhiwu Xuebao* 1989, *31,* 73; *Chem. Abstr.* 1990, *112,* 4550 h); nerolidol (29.3), limonene (18.2), linalool (16.4) and farnesol (15.7%) determined in flower essential oil (*J. Essent. Oil Res.* 1991, *3,* 359; *Chem. Abstr.* 1992, *116,* 91115 u); isolation of prenylcitpressine and grandisinine from root bark (*Indian J. Nat. Prod.* 1992, *8*(1), 18; *Chem. Abstr.* 1993, *119,* 91186 e); 5-geranyloxy-7-methoxycoumarin, isoimperatorin, bergapten and 5-geranyloxypsoralen (bergamottin) isolated from fruits (*Zagazig J. Pharm. Sci.* 1994, *3,* 20; *Chem. Abstr.* 1994, *121,* 226449 g).

C. hystrix DC.; see *C. latipes* (Swingle) Tanaka

C. latipes (Swingle) Tanaka syn. *C. hystrix* auct. (non DC.)

Eng. - Mauritius papeda, Porcupine orange.

(–)Citronellal determined in leaf oil (81.0), twig oil (78.64) and peel oil (23.64%); leaf oil also contained β-pinene, sabinene, 2,6-dimethyl-5-heptenal, citronellic acid and safrole whereas twig oil contained β-pinene and sabinene (*J. Essent. Oil Res.* 1990, *2,* 179; *Chem. Abstr.* 1990, *113,* 210353 v).

Distribution: Cultivated in eastern India.

C. limetta Risso syn. *C. limettioides* Tanaka, *C. medica* L. var. *limetta* Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 186).

Determination of limonene (60.17), γ-terpinene (11.80), terpinolene (2.96), β-pinene (2.08), linalool (1.85), p-cymene (1.38), geranial (1.33) and α-terpineol (1.28%) in peel essential oil (0.014%) (*Pakistan J. Sci. Ind. Res.* 1992, *35,* 449; *Chem. Abstr.* 1993, *119,* 179585 v).

C. limettioides Tanaka; see *C. limetta* Risso

C. limon (L.) Burm.f. syn. *C. medica* L. var. *limonum* (Risso) Hook. f., *C. limonum* Risso, *C. medica* L. var. *limon* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 190).

Limonin, nomilin, deacetylnomilin, obacunone, deacetylnomilinic acid and their 17β-D-glucopyranosides and ichangin from seeds (*Agric. Biol. Chem.* 1991, *55,* 137).

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BIOLOGICAL ACTIVITY

Adenosine (i.v.) lowered blood pressure in spontaneously hypertensive rats (*Nippon Nogei Kagaku Kaishi* 1989, *63,* 1373; *Chem. Abstr.* 1990, *112,* 73757 t).

C. limonia Osbeck

Eng. - Lemandarine, Marmalade, Orange, Rangpur lime, Sharbate lime; H. - Surkh nimboo; Assam - Sinduri nemu-tenga.

Seeds contained 19.3 and peel 11.2% of oil; fruits contained oleic acid (27.23%) whereas peel oil contained limonene, γ-terpinene, p-cymene and terpinolene (*Riv. Ital. Sostanze Grasse* 1988, *65,* 501; *Chem. Abstr.* 1990, *112,* 6289 d).

Distribution: Bombay-Deccan region, also in northern, western and southern India.

C. limonum Risso; see *C. limon* (L.) Burm.f.

C. maxima (Burm.) Merr.; see *C. grandis* (L.) Osbeck

C. medica L. var. *acida* Hook.f.; see *C. aurantifolia* (Christm.) Swingle

C. medica L. var. *limetta* Wt. & Arn.; see *C. limetta* Risso

C. medica L. var. *limon* L.; see *C. limon* (L.) Burm.f.

C. medica L. var. *limonum* (Risso) Hook.f.; see *C. limon* (L.) Burm.f.

C. nobilis Lour.; see *C. reticulata* Blanco

C. paradisi Macf. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 192).

Seeds contained 17.6 and peel 8.4% of oil; peel oil contained limonene, γ-terpinene, p-cymene and terpinolene (*Riv. Ital. Sostanze Grasse* 1988, *65,* 501; *Chem. Abstr.* 1990, *112,* 6289 d); 17-O-β-D-glucopyranosides of nomilinic acid, deacetylnomilinic acid, iso-obacunoic acid, epi-isoobacunoic acid, obacunoic acid and trans-obacunoic acid isolated from seeds (*Phytochemistry* 1989, *28,* 2777);17-β-D-glucopyranosidesof limonin, nomilin, deacetylnomilin, obacunone and deacetylnomilinic acid and ichangin from seeds (*Agric. Biol. Chem.* 1991, *55,* 137); isolation and structure elucidation of naringin-6"-malonate from leaves and fruits (*Phytochemistry* 1991, *30,* 4198); p-cymene, terpinen-4-ol, linalool and limonene identified as major constituents in leaf oil (*J. Essent. Oil. Res.* 1991, *3,* 55; *Chem. Abstr.* 1991, *114,* 192226v);

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identification of palmitic, oleic, linoleic, stearic and linolenic acids in seed oil of Nigerian plant (*Food Chem.* 1993, *47,* 77; *Chem. Abstr.* 1993, *118,* 232624 q); an alkaloid - azacridone A - isolated from roots and its structure determined (*Chem. Pharm. Bull.* 1993, *41,* 789); friedelin as major constituent along with α-amyrin, its acetate, β-amyrin, its acetate, α-, β-amyrones and 24-methylenecycloartanol identified in fruit epicuticular wax by TLC (*J. Agric. Food Chem.* 1994, *42,* 708; *Chem. Abstr.* 1994, *120,* 162147 b).

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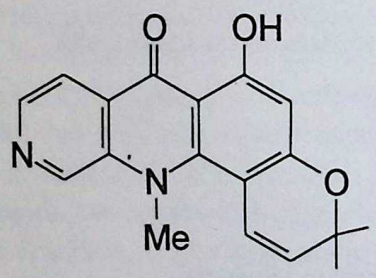
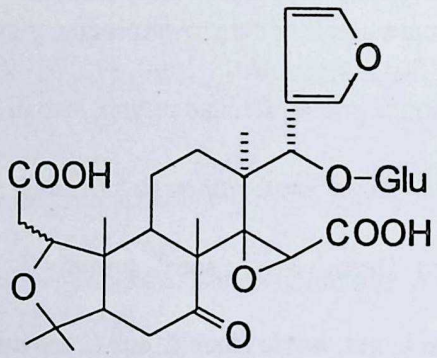
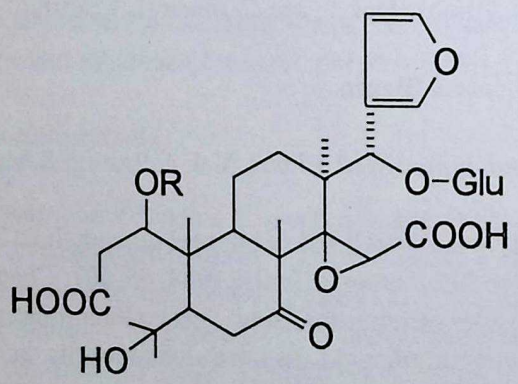


Azacridone A



Iso-obacunoic acid-17-β-D-glucoside
~~ = β
Epi-isoobacunoic acid-17-β-D-glucoside
~~ = α



Nomilinic acid-17-β-D-glucoside
R = Ac
Deacetylnomilinic acid-17-β-D-glucoside
R = H

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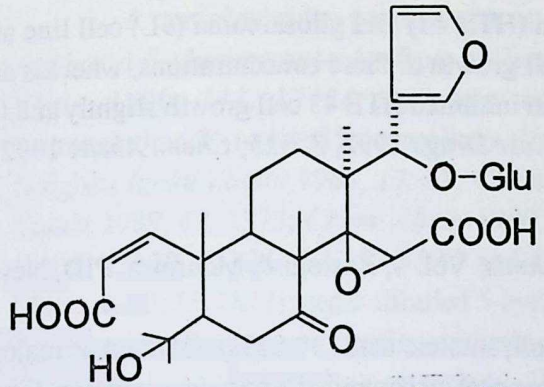
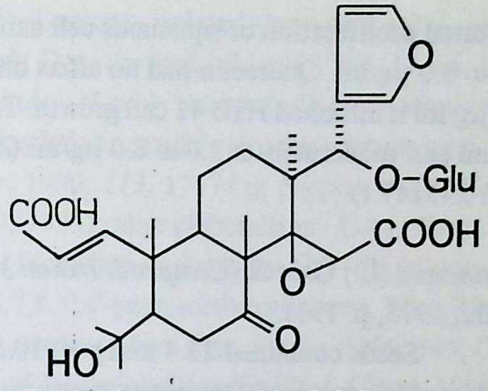


Obacunoic acid-17-β-D-glucoside



Trans-obacunoic acid-17-β-D-glucoside

BIOLOGICAL ACTIVITY

Naringenin, quercetin and kaempferol inhibited metabolism of dihydropyridine derivatives, nifedipine and enantiomers of felodipine in rat and human liver microsomes. Naringenin showed lower inhibitory action than quercetin and kaempferol. Their possible mechanism of action is by inhibition of isoenzyme, cytochrome P-450 IIIA4 (*J. Pharmacol. Exp. Ther.* 1992, *261,* 1195).

C. reticulata Blanco syn. *C. nobilis* Lour. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 192).

Determination of linalool (29.68) and citronellal (26.57%) in flower oil (*Linchan Huaxue Yu Gongye* 1989, *9,* 55; *Chem. Abstr.* 1990, *112,* 33361 c); γ-terpinene (20.15), p-cymene (16.29), linalool (9.55) and terpinen-4-ol (7.13%) determined in leaf oil by GC-MS (*J. Essent. Oil Res.* 1990, *2,* 329; *Chem. Abstr.* 1991, *114,* 108682 k); 17β-D-glucosides of limonin, nomilin, deacetylnomilin, obacunone, deacetylnomilinic acid and ichangin isolated from seeds (*Agric. Biol. Chem.* 1991, *55,* 137); palmitic, oleic, linoleic, stearic and linolenic acids identified in seed oil of Nigerian plant (*Food Chem.* 1993, *47,* 77; *Chem. Abstr.* 1993, *118,* 232624 q); stereoselective synthesis of elemol (*Tetrahedron Lett.* 1993, *34,* 6557); 5-hydroxy-3,7,8,3',4'-pentamethoxyflavone, 3,5,6,7,3',4'-hexamethoxyflavone, 5,7,8,4'-tetramethoxyflavone and 3,5,7,8,3',4'-hexamethoxyflavone isolated from peel (*Prikl. Biolkhim. Mikrobiol.* 1993, *29,* 604; *Chem. Abstr.* 1994, *120,* 4653 j); isolation of β-sitosterol, β-amyrin and naringenin from fruits (*Asian J. Chem.* 1994, *6,* 180; *Chem. Abstr.* 1994, *120,* 265846 h).

BIOLOGICAL ACTIVITY

Polysaccharides containing galacturonic acid showed anti-allergic activity (*Shizuoka-Ken Eisei Kankyo Senta Hokoku* 1991, *34,* 19; *Chem. Abstr.* 1993, *118,* 139429 v); effects of quercetin, taxifolin, nobiletin and tangeretin were studied on *in vitro* growth of human squamous cell carcinoma HTB 43. Cell cultures were treated with each flavonoid (2.0 to 8.0 μg/ml) for 3 to 7 days. Nobiletin and tangeretin markedly inhibited cell growth at all concentrations tested on days 5 and 7. Inhibition was 70 to 72% at 8.0 μg/ml on day 3, whereas on day 5 it was 61 to 88% at 2.0 to 4.0 μg/ml. Quercetin and taxifolin exhibited no inhibition at any concentration tested (*Cancer Lett.* 1991, *56,* 147; *Chem. Abstr.* 1991, *114,* 156763 j); tangeretin and nobiletin markedly

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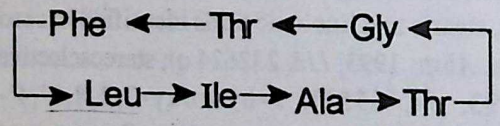
inhibited proliferation of squamous cell carcinoma (HTB 43) and gliosarcoma (9L) cell line at 2.0 to 8.0 μg/ml. Quercetin had no effect on 9L cell growth at these concentrations, whereas at 8.0 μg/ml it inhibited HTB 43 cell growth. Taxifolin inhibited HTB 43 cell growth slightly at 8.0 μg/ml and moderately at 2.0 to 8.0 μg/ml (*Anticancer Drugs* 1992, *3*, 525; *Chem. Abstr.* 1992, *117*, 245147 r).

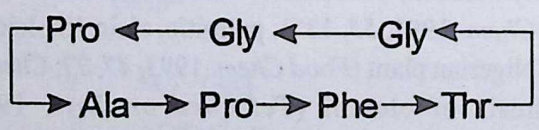
C. sinensis (L.) Osbeck (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 193).

Seeds contained 21.4 and peel 10.5% of oil; linoleic acid (37.82%) obtained as major acid; seed oil contained γ-terpinene, p-cymene whereas peel oil contained terpinolene and limonene (*Riv. Ital. Sostanze Grasse* 1988, *65*, 501; *Chem. Abstr.* 1990, *112*, 6289 d); 17β-D-glucopyranosides of limonin, nomilin, deacetylnomilin, obacunone and deacetylnomilinic acid along with ichangin isolated from seeds (*Agric. Biol. Chem.* 1991, *55*, 137); four new cyclic peptides - citrusins I, II, III and IV - isolated and their structures established (*Agric. Biol. Chem.* 1991, *55*, 2923); hesperidin (0.53) and narirutin (0.04%) determined in peel by HPLC (*Han'guk Yongyang Siklyong Hakhoechi* 1992, *21*, 136; *Chem. Abstr.* 1992, *117*, 232617 u); determination of isofucosterol (48.9), 24-methylenecholesterol (19.9), sitosterol (15.3) and 24-methyldesmosterol (10.8%) in pollen (*Biosci., Biotechnol., Biochem.* 1992, *56*, 670; *Chem. Abstr.* 1992, *117*, 4267 z); palmitic, oleic, linoleic, stearic and linolenic acids identified in seed oil (*Food Chem.* 1993, *47*, 77; *Chem. Abstr.* 1993, *118*, 232624 q); limonene, α-pinene, myrcene, longipinene, bulgarene, sativene, longifolene, α-humulene, cadinene, β-terpineol, campholenal, 3-pinocarveol, neral, carveol, carvone and nootkatone identified in essential oil by GC-MS (*Zhongshan Daxue Xuebao, Ziran Kexueban* 1993, *32*, 97; *Chem. Abstr.* 1994, *120*, 307033 y).

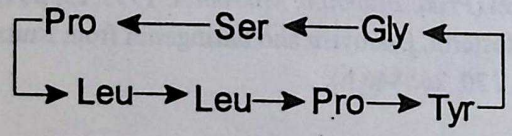
NEW COMPOUNDS



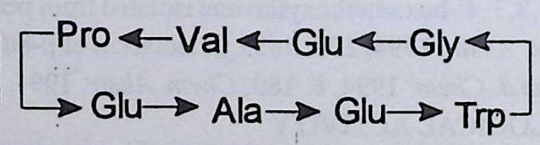
Citrusin I



Citrusin II



Citrusin III



Citrusin IV

BIOLOGICAL ACTIVITY

Hesperidin (1.0 mg/100 g, i.v.) lowered blood pressure significantly of Sprague Dawley rats (*Han'guk Tongyang Siklyong Hokhoechi* 1992, *21*, 136; *Chem. Abstr.* 1992, *117*, 232617 u).

C. unshiu Macrovitch (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 193).

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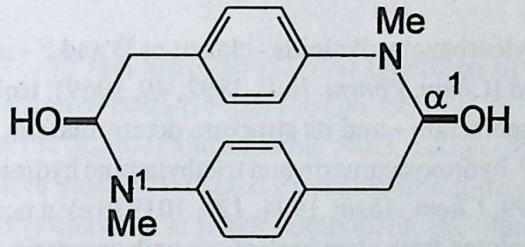
A new glucoside - hexyl-β-glucosyl(6→1)-β-apiose - isolated along with ethyl-, propyl- and hexyl-β-glucopyranosides from peelings (*Kinki Daigaku Igaku Zasshi* 1988, *13*, 61; *Chem. Abstr.* 1990, *113*, 17474 g); a new compound - N,α¹,N¹,α-cyclodi-(4-methylamino-benzene)ethanol - isolated from peelings along with adenosine and its structure determined (*Kinki Daigaku Igaku Zasshi* 1988, *13*, 61; *Chem. Abstr.* 1990, *113*, 17474 g; *Nippon Nogei Kagaku Kaishi* 1989, *63*, 1373; *Chem. Abstr.* 1990, *112*, 73757 t); nine gibberellins - GA1, GA4, GA9, GA19, GA20, GA24, GA25, GA44 and GA53 - identified in fruits by GC-MS (*Agric. Biol. Chem.* 1989, *53*, 2817); peels afforded 5-hydroxy-6,7,8,3',4'-pentamethoxyflavone, 3,5,6,7,8,3',4'-heptamethoxyflavone, tangeretin, nobiletin and sinensetin (*Khim. Prir. Soedin.* 1990, 545; *Chem. Abstr.* 1991, *114*, 118509 y); citrusins I, II, III and IV isolated (*Agric. Biol. Chem.* 1991, *55*, 2923); sitosterol (49.3), isofucosterol (27.1), 24-methylenecholesterol (11.5) and campesterol (8.5%) determined in pollen (*Biosci., Biotechnol., Biochem.* 1992, *56*, 670; *Chem. Abstr.* 1992, *117*, 4267 z); isolation of 17β-D-glucosides of limonin, nomilin, nomilinic acid and obacunone and glucosides of deacetylnomilin and deacetylnomilinic acid from juice (*Biosci., Biotechnol., Biochem.* 1992, *56*, 836; *Chem. Abstr.* 1992, *117*, 47026 n).

NEW COMPOUNDS



N,α¹,N¹,α-Cyclodi-(4-methylaminobenzene)ethanol

BIOLOGICAL ACTIVITY

Ethyl glucopyranoside and adenosine lowered blood pressure whereas N,α¹,N¹,α-cyclodi-(4-methylaminobenzene)ethanol, hexyl glucopyranoside and hexyl-β-glucosyl(1→6)-β-apiose raised blood pressure at a dose of 1.0 mg/100 g, i.v., in spontaneously hypertensive rats (*Kinki Daigaku Igaku Zasshi* 1988, *13*, 61; *Chem. Abstr.* 1990, *113*, 17474 g; *Nippon Nogei Kagaku Kaishi* 1989, *63*, 1373; *Chem. Abstr.* 1990, *112*, 73757 t); narcissin showed anti-inflammatory activity in rats and had hypertensive effect in cats probably mediated by its adrenomimetic activity. It had low toxicity (*Dokl. Akad. Nauk. Resp. Uzb.* 1992, 41; *Chem. Abstr.* 1993, *119*, 216771 a).

CLAUSENA (Rutaceae)

C. anisata Hook.f. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 195).

Anethole isolated as major constituent from seeds (0.33%) and pericarps (0.18%); p-anisaldehyde, isoimperatorin, imperatorin, osthol , bergapten, xanthotoxin, isomeranzin, xanthotoxol and auraptenol also isolated (*Pharmazie* 1989, *44*, 736; *Chem. Abstr.* 1990, *112*, 95552 z); two new geranylcoumarins - anisocoumarin I and anisocoumarin J - isolated from

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leaves and their structures determined (*Phytochemistry* 1991, *30*, 2809).

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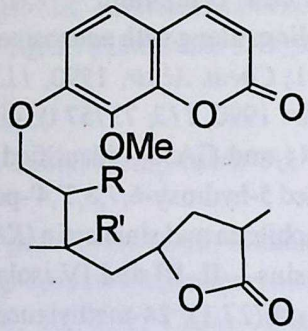

Anisocoumarin I
RR' = -O-
Anisocoumarin J
R,R' = OH

C. excavata Burm.f. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 178).

Two new 4-prenylcarbazole alkaloids - clausines D and F - isolated from stem bark and their structures established (*Chem. Pharm. Bull.* 1992, *40,* 1069); isolation from leaves of a new macrocylic lactam - clausenlactam - and its structure determination; zapoterin, myricetin-3-O-rhamnoside, ferulic acid, 7-hydroxycoumarin and triethylamine hydroiodide also isolated (*Yunnan Zhiwu Yanjiu* 1993, *15,* 299; *Chem. Abstr.* 1994, *120,* 101930 e); a new pentanortriterpenoid - 1-O-methylclausenolide - isolated from stem bark along wtih zapoterin and its structure elucidated (*J. Chin. Chem. Soc.* 1993, *40,* 319; *Chem. Abstr.*1993, *119,* 91282 h); determination of β-caryophyllene (25.3), germacrene B (11.8) and β-phellandrene (9.2%) in essential oil (*J. Essent. Oil Res.* 1994, *6,* 99; *Chem. Abstr.* 1994, *121,* 104055 e).

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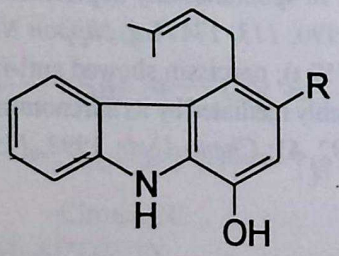
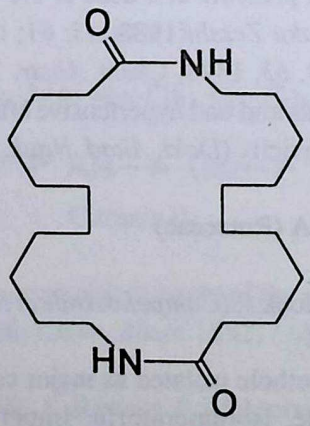


Clausine D
R = CHO
Clausine F
R = COOMe



Clausenlactam

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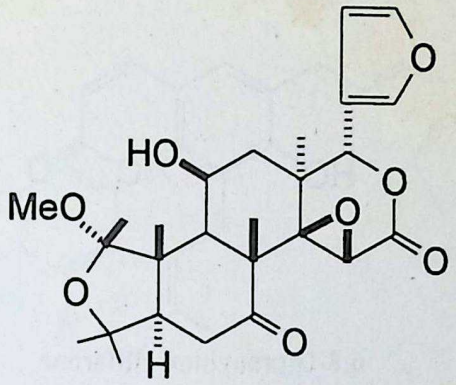


1-O-Methylclausenolide

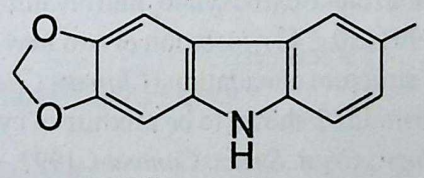
BIOLOGICAL ACTIVITY

Clausine D and clausine F showed significant antiplatelet aggregation activity (*Chem. Pharm. Bull.* 1992, *40,* 1069).

C. heptaphylla Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 195).

Methyl chavicol (75.6) and anethole (21.7%) identified in leaf essential oil of plant growing in north-eastern region of India (*Indian Perfum.* 1991, *35,* 97; *Chem. Abstr.* 1991, *115,* 189466 p); methyl chavicol (57.2, 86.2) and anethole (40.3, 12.7%) determined in leaf and fruit oils respectively; comparative studies indicated existence in nature of two chemotypes of this taxon, one containing methyl chavicol as major component, the other anethole (*J. Essent. Oil Res.* 1992, *4,* 655; *Chem. Abstr.* 1993, *118,* 98077 h); a new carbazole alkaloid - clausenalene - isolated from stem bark and its structure established as 3-methyl-6,7-methylenedioxycarbazole by synthesis (*Phytochemistry* 1993, *33,* 248).

NEW COMPOUNDS



Clausenalene

BIOLOGICAL ACTIVITY

Clausenalene exhibited antibacterial activity against both Gram +ve and Gram –ve bacteria, minimum inhibitory concentration was 50.0 μg/ml (*Phytochemistry* 1993, *33,* 248).

C. indica (Dalz.) Oliv. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 189).

Isolation and structure elucidation of 6,8-diprenylumbelliferone from roots; 3-(1,1-dimethylallyl)xanthyletin, 5-methoxyxanthyletin, clausenidin, clausenin and murrayanine (*Fitoterapia* 1989, *60,* 347).

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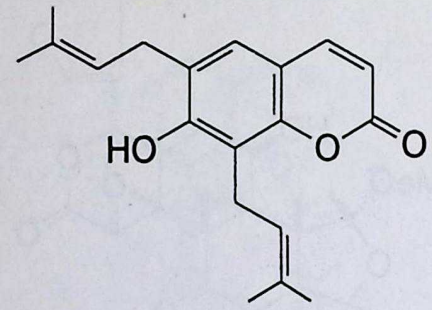
NEW COMPOUNDS



6,8-Diprenylumbelliferone

BIOLOGICAL ACTIVITY

3-(1,1-Dimethylallyl)xanthyletin and 5-methoxyxanthyletin showed spasmolytic activity in isolated guinea pig ileum (*Fitoterapia* 1989, *60,* 347).

C. lansium (Lour.) Skeels syn. *C. wampi* Blanco (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 195).

Separation of diastereomers, neoclausenamide and isoneoclausenamide; determination of their crystal structures and synthesis (*Chinese Sci. Bull.* 1989, *34,* 957; *Chem. Abstr.* 1990, *112,* 198860 c); a new sesquiterpene ketone - (+)oplopanone - isolated and its structure determined; imperatorin, 8-geranyloxypsoralen and wampetin (dehydroindicolactone) also isolated (*J. Chin. Chem. Soc.* 1990, *37,* 571; *Chem. Abstr.* 1991, *114,* 139767 w); isolation of indicolactone, anisolactone and 2",3"- epoxyanisolactone from leaves (*Zhongcaoyao* 1990, *21,* 535; *Chem. Abstr.* 1991, *114,* 203517 u); clausenamide synthesised (*Synlett* 1991, 343; *Chem. Abstr.* 1991, *115,* 91943 s; *Chinese Chem. Lett.* 1994, *5,* 267; *Chem. Abstr.* 1994, *121,* 157399 b); three new carbazole alkaloids - 3-formyl-6-methoxycarbazole, methyl 6-methoxycarbazole-3-carboxylate and 3-formyl-1,6-dimethoxycarbazole - isolated from roots and their structures determined; 3-formylcarbazole and methyl carbazole-3-carboxylate, murrayanine, glycozoline and indizoline also isolated (*Phytochemistry* 1991, *30,* 343); isolation of two new lactams - homoclausenamide and ζ-clausenamide - and their structure elucidation (*Chinese Chem. Lett.* 1991, *2,* 291; *Chem. Abstr.* 1991, *115,* 155059 t); lansimide 2 shown to be mixture of cyclic amides I and II by crystal structure analysis (*Acta Crystallogr., Cryst. Struct. Commun.* 1992, *48C,* 1082; *Chem. Abstr.* 1992, *117,* 90038 e).

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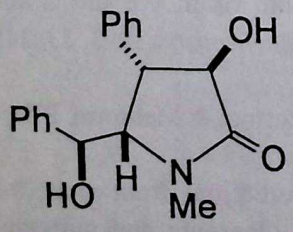
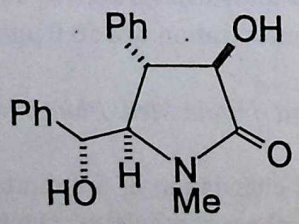
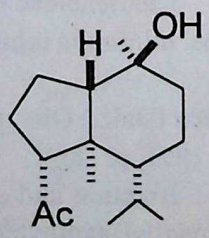


Neoclausenamide



Isoneoclausenamide



(+) Oplopanone

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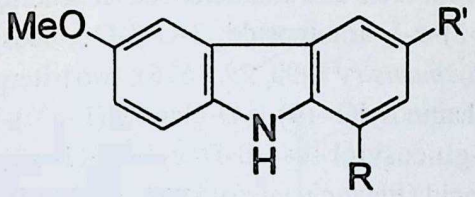
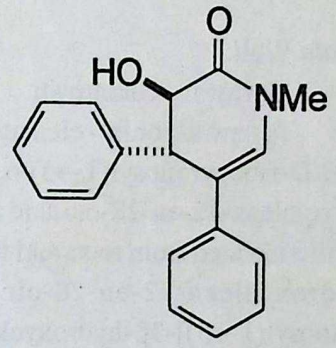
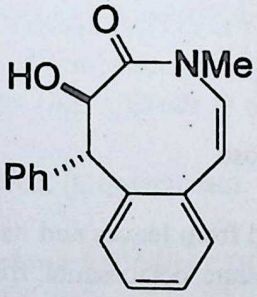
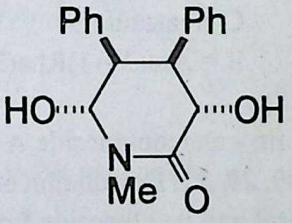


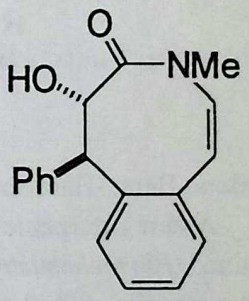


3-Formyl-6-methoxycarbazole
R = H, R' = CHO
3-Formyl-1,6-dimethoxycarbazole
R = OMe, R' = CHO
Methyl 6-methoxycarbazole-3-carboxylate
R = H, R' = COOMe

Homoclausenamide







δ-Clausenamide

Cyclic amide I

Cyclic amide II

C. wampi Blanco; see *C. lansium* (Lour.) Skeels

CLEISTANTHUS (Euphorbiaceae)

C. collinus (Roxb.) Benth. ex Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 198).

(+)Collinusin synthesised (*Chem. Pharm. Bull.* 1989, *37,* 3161).

CLEISTOCALYX (Myrtaceae)

C. operculatus (Roxb.) Merrill & Perry; see *Syzygium operculatum* (Roxb.) Niedenzu

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CLEMATIS (Ranunculaceae)

C. grata Wall.

Garhwal - Ghantiyali.

A new saponin - clematoside S - isolated from roots and characterised as hederagenin-3-O-β-D-ribopyranosyl(1→3)-α-L-rhamnosyl(1→2)-α-L-arabinoside; 3-O-β-D-glucosyl-3β-hydroxyolean-12-en-28-oic acid also isolated (*Phytochemistry* 1990, *29*, 3676); two triterpenoid saponins isolated from roots and identified as [α-L-rhamnosyl(1→4)-β-D-glucosyl(1→3)]-3,23β-dihydroxyolean-12-en-28-oic acid and [β-D-glucosyl(1→4)-β-D-xylosyl(1→3)-α-L-rhamnosyl(1→3)]-3β-hydroxyolean-12-en-28-oic acid (*Phytochemistry* 1992, *31*, 1427).

Distribution: Himalayas, Kumaon westwards, alt. 600-2400 m.

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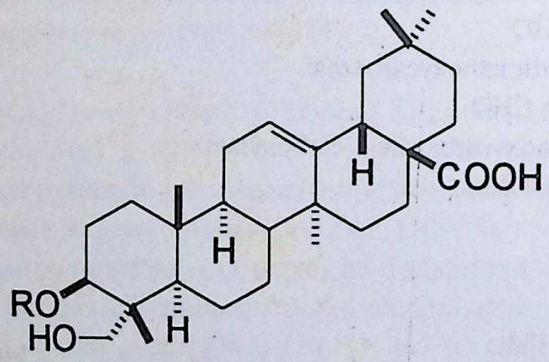

Clematoside S

R = Ara(2→1)Rha(3→1)Ribose

C. montana Buch.-Ham. ex DC.

A new triterpenic saponin - clemontanoside A - isolated from leaves and its structure determined (*Phytochemistry* 1989, *28*, 2511); isolation of pentacosane, octacosanol, friedelin, β-amyrin, oleanolic acid, β-sitosterol and its glucoside from leaves and stems (*Fitoterapia* 1989, *60*, 477; *ibid.* 1993, *64*, 472); isolation and structure elucidation of a new saponin - clemontanoside B - from leaves (*Int. J. Crude Drug Res.* 1990, *28*, 39); two saponins isolated and characterised as 3-O-β-ribopyranosyl(1→3)-α-rhamnosyl(1→2)-α-arabinopyranosido-28-O-α-L-rhamnosyl-(1→4)-β-D-glucosyl(1→6)-β-D-glucopyranoside and 3-O-ribopyranosyl(1→3)-α-L-rhamnosyl(1→2)-α-L-arabinopyranoside of hederagenin (*Int. J. Crude Drug Res.* 1990, *28*, 125); another new saponin - clemontanoside C - isolated from stem and characterised as hederagenin-3-O-α-L-arabinosyl(1→3)-α-L-rhamnosyl (1→2)-α-L-arabinopyranoside; in addition, hederagenin-3-O-α-L-arabinopyranoside and hederagenin-3-O-α-L-rhamnopyranosyl(1→2)-α-L-arabinopyranoside also isolated (*Phytochemistry* 1993, *33*, 671); isolation and structure determination of a new triterpenic bisglycoside - clemontanoside F - from roots (*Phytochemistry* 1993, *34*, 861).

Distribution: Himalayas, from Kashmir to Arunachal Pradesh, alt. 1600-4000 m and Khasi Hills alt. 1200 m.

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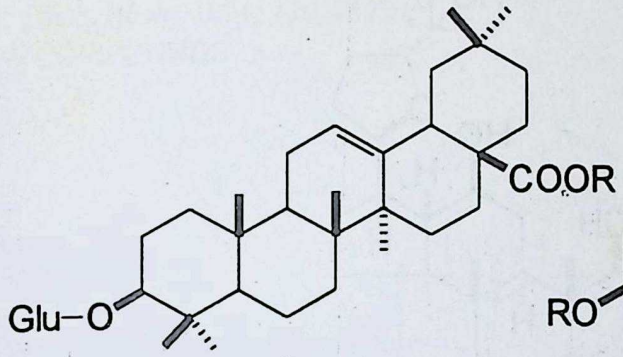

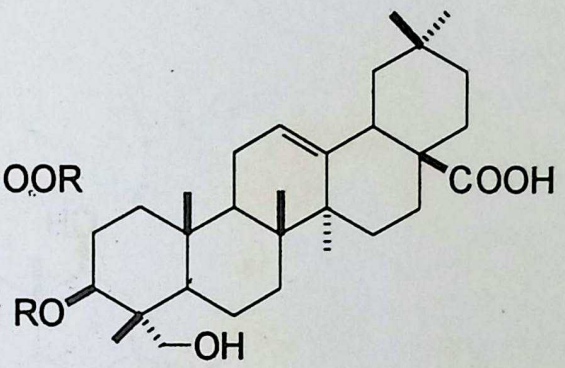

Clemontanoside A
R = Glu[(2→1)Rha](6→1)Glu
Clemontanoside B
R = Glu[(2→1)Glu](6→1)Rha
Clemontanoside F
R = Glu[(2→1)Rha](6→1)Gal

Clemontanoside C
R = Ara(2→1)Rha(3→1)Ara

BIOLOGICAL ACTIVITY

Clemontanoside B exhibited CNS depressant activity in albino mice having ALD50 1.0 g/kg, i.p. (*Int. J. Crude Drug Res.* 1990, *28*, 39).

CLEOME (Capparaceae)

C. brachycarpa Vahl ex DC.; see *C. vahliana* Farsen.

C. brachycarpa Vahl ex DC. var. *glauca* Blatt. & Hall.; see *C. vahliana* Farsen.

C. brachycarpa Vahl ex DC. var. *longipetiolata* Sabins; see *C. vahliana* Farsen.

C. burmanii Wt. & Arn. syn. *Polanisia dodecandra* DC.

A new cytotoxic triterpene - polacandrin - isolated and its strucutre elucidated as 1β,3α,12β,25-tetrahydroxy-20(S),24(S)-epoxydammarane by X-ray analysis (*J. Nat. Prod.* 1992, *55*, 1488).

Distribution: Karnataka, in plains.

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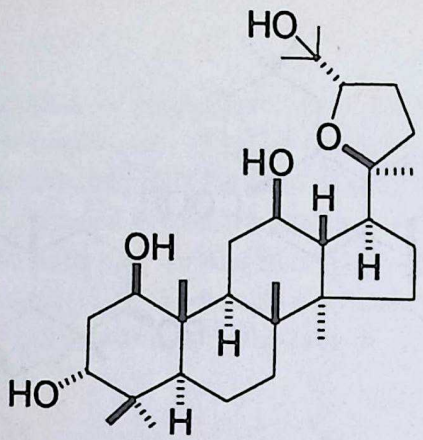

Polacandrin

BIOLOGICAL ACTIVITY

Polacandrin was highly toxic to KB (ED50 0.60 μg/ml), P-388 (ED50 0.90 μg/ml) and RPMI-7951 (ED50 0.62 μg/ml) tumor cells (*J. Nat. Prod.* 1992, *55*, 1488).

C. gynandra L. syn. *C. pentaphylla* L., *Gynandropsis gynandra* (L.) Briq., *G. pentaphylla* (L.) DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995 p. 198).

Crystal structure and conformation of centaureidin determined (*Acta Crystallogr., Cryst. Struct. Commun.* 1989, *45*C, 1827; *Chem. Abstr.* 1990, *113*, 23425 h).

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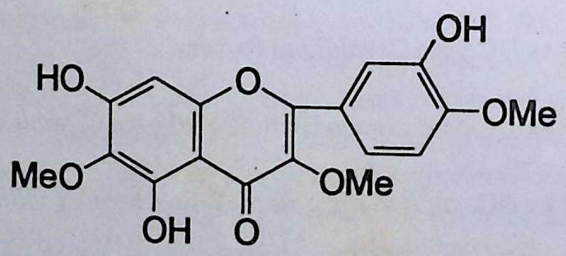

Centaureidin

C. icosandra L.; see *C. viscosa* L.

C. pentaphylla L.; see *C. gynandra* L.

C. vahliana Farsen. syn. *C. brachycarpa* Vahl ex DC., *C. brachycarpa* Vahl ex DC. var *glauca* Blatt. & Hall., *C. brachycarpa* Vahl ex DC. var. *longipetiolata* Sabins (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 199).

A new triterpenoid - cleocarpone - isolated and its crystal structure determined

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(*Phytochemistry* 1990, *29*, 670); isolation of quercetin-3,7-di-O-rhamnoside and kaempferol-3-O-β-L-rhamnosyl(3→1)-L-rhamnoside from aerial parts (*Alexandria J. Pharm. Sci.* 1993, *7*, 121; *Chem. Abstr.* 1994, *120*, 4593 q).

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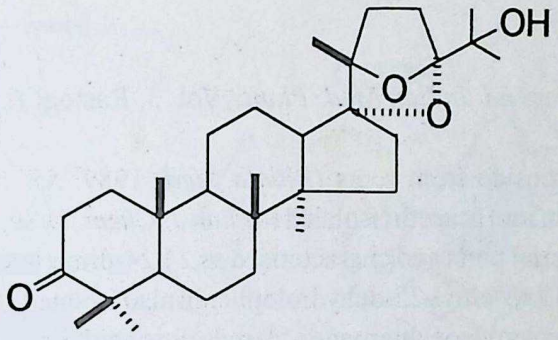

Cleocarpone

C. viscosa L. syn. *C. icosandra* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 199).

A new macrocyclic diterpene - cleomaldeic acid - isolated and characterised as (3E,7E,11E)20-oxocembra-3,7,11,15-tetraen-19-oic acid (*Phytochemistry* 1990, *29*, 666).

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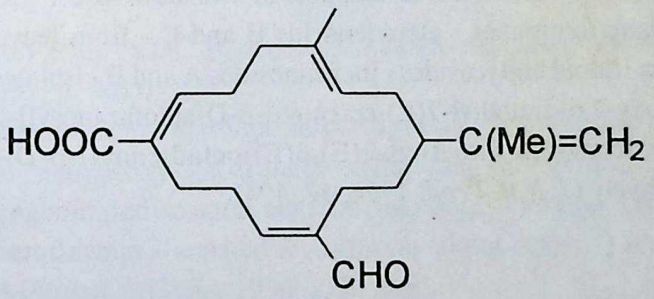

Cleomaldeic acid

129448

CLERODENDRUM (CLERODENDRON) (Verbenaceae)

C. colebrookianum Walp. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 184).

Effect of multiple weekly (20.0, 40.0 and 80.0 mg/kg) and daily therapeutic (2.0, 4.0 and 8.0 mg/kg, i.p.) doses of leaf extract on liver and kidney functions and haematological parameters in mice studied. It was found that high dose (above 40.0 mg/kg) affected liver and kidney functions and metabolism and also altered clotting time and ESR whereas therapeutic dose (2.0 to 8.0 mg/kg) did not exhibit any toxic action (*Indian J. Exp. Biol.* 1994, *32*, 189).

C. fragrans Hort. ex Vent.; see *C. philippinum* Schauer

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C. indicum (L.) O.Kuntze syn. *C. siphonanthus* R.Br. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 201).

4,4'-Di-O-methylapigenin isolated (*Indian J. Chem.* 1989, *28*B, 878); isolation of hispidulin, scutellarein and their 7-O-β-D-glucuronides (*Pharmazie* 1993, *48*, 151; *Chem. Abstr.* 1993, *118*, 240557 k).

C. inerme (L.) Gaertn. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 184).

Isolation of verbascoside from roots (*Planta Med.* 1989, *55*, 577); 5-hydroxy-7,4'-dimethoxyflavone, salvigenin and acacetin isolated (*Indian J. Chem.* 1989, *28*B, 874); a new 4α-methylsterol isolated from aerial parts and characterised as 24,24-dimethyl-25-dehydrolophenol; gramisterol, obtusifoliol and 24β-ethyl-25-dehydrolophenol also isolated (*Phytochemistry* 1990, *29*, 1639); isolation of a new clerodane diterpene - clerodermic acid, mp. 161° - and its structure determination together with isolation of friedelin, 5-hydroxy-7,4'-dimethoxyflavone, salvigenin, acacetin and apigenin (*Phytochemistry* 1990, *29*, 3671); isolation and structure determination of a new neo-clerodane diterpenoid - cleroinermin, mp. 147° - from aerial parts; apigenin also isolated (*Phytochemistry* 1991, *30*, 3812); a new diterpene isolated from leaves and characterised as 15-methoxy-14,15-dihydro-3-epicaryoptin (*Phytochemistry* 1992, *32*, 338); flowers afforded lysine, arginine, serine, proline, threonine, glutamic acid, galactose, glucose and fructose (*Indian Drugs* 1992, *29*, 246); isolation and structure elucidation of two new insect growth inhibitor and antifeedant neo-clerodane diterpenes - clerodendrins B and C - from leaves (*Phytochemistry* 1993, *34*, 572); two new iridoid biglycosides - inerminosides A and B - isolated and characterised as 2'-O-[5"-O-(8-hydroxy-2,6-dimethyl-2(E)-octenoyl)-β-D-apiofuranosyl]-mussaenosidic acid and 2'-O-[5"-O-(8-hydroxy-2,6-dimethyl-2(E),6(E)-octadienoyl)-β-D-apiofuranosyl]-8-epiloganic acid respectively (*J. Nat. Prod.* 1994, *57*, 494).

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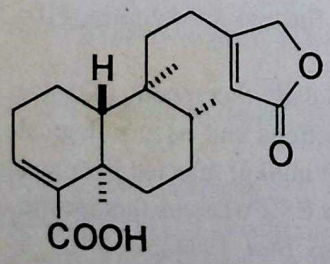
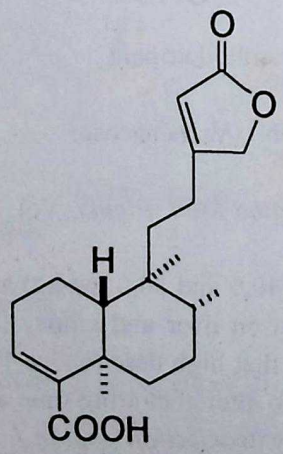
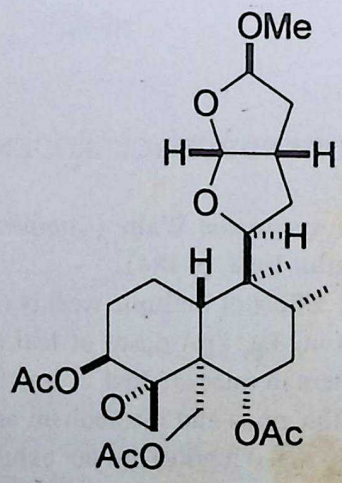


Clerodermic acid



Cleroinermin



15-Methoxy-14,15-dihydro-3-epicaryoptin

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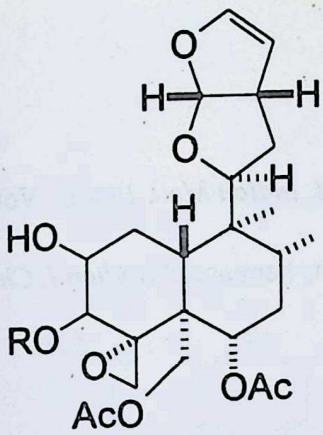

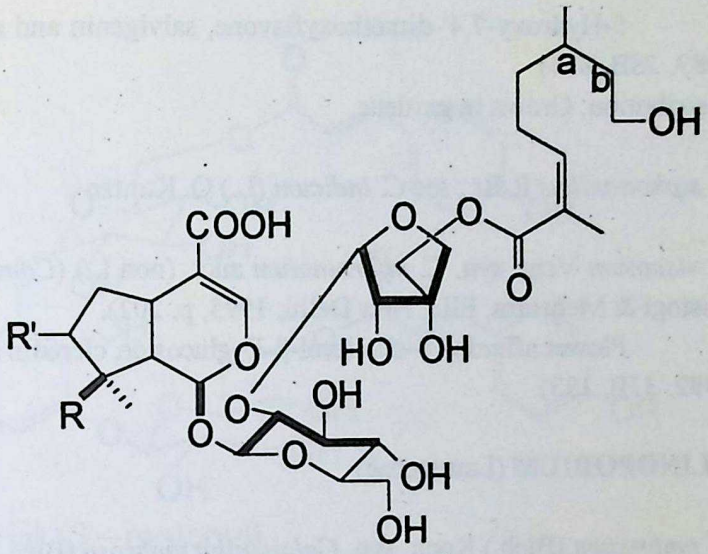

Clerodendrin B
R = 2-Acetoxy-2-methylbutyryl
Clerodendrin C
R = 2-Acetoxy-2-methylpropionyl

Inerminoside A
R = OH, R' = H
Inerminoside B
R = H, R' = β-OH, ab = Δ

C. infortunatum L.; see *C. viscosum* Vent.

C. neriifolium (Roxb.) Wall. ex DC. (*Compend. Indian Med. Plants,* Vol. 4; Rastogi & Mehrotra, PID, New Delhi, 1995, p. 201).

Isolation of brassicasterol, campesterol, stigmasterol, β-sitosterol, 24(S)-ethyl-cholesta-5,22,25-trien-3β-ol, 5-hydroxy-7,4'-dimethoxyflavone, salvigenin, cirsimaritin, acacetin, pectolinarigenin, apigenin and scutellarein from leaves (*Fitoterapia* 1989, *60,* 281); a new C-methyl flavone - cleroflavone - isolated from leaves along with (–) hardwickiic acid and its structure elucidated (*Indian J. Chem.* 1990, *29*B, 289).

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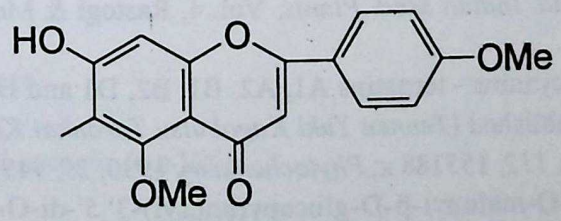

Cleroflavone

C. philippinum Schauer syn *C. fragrans* Hort. ex Vent. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 201).

Sorbifolin and cirsimaritin isolated (*Indian J. Chem.* 1989, *28*B, 878).

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C. scandens P. Beauv.

5-Hydroxy-7,4'-dimethoxyflavone, salvigenin and acacetin isolated (*Indian J. Chem.* 1989, *28*B, 874).

Distribution: Grown in gardens.

C. siphonanthus R.Br.; see *C. indicum* (L.) O. Kuntze

C. viscosum Vent. syn. *C. infortunatum* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 202).

Flower afforded β-sitosterol-β-D-glucoside, clerodin and its hemiacetal (*Indian J. Chem.* 1992, *31*B, 133).

CLINOPODIUM (Lamiaceae)

C. umbrosum (Bieb.) Koch. syn. *Calamintha umbrosa* (Bieb.) Benth.

H. - Jangli pudina; Mar. - Karimthumba.

Determination of cis-piperitenone oxide (63.05) and piperitenone oxide (17.98%) in essential oil of plant from north-west Himalayan region (*J. Essent. Oil Res.* 1992, *4*, 47; *Chem. Abstr.* 1993, *118*, 187836 x).

Distribution: Himalayas, from Kashmir to Bhutan, alt. 1200-3600 m, Arunachal Pradesh, Khasi Hills upto 1300 m, and in the hills of peninsular India.

C. vulgare L. syn. *Calamintha clinopodium* Benth. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 44).

Isolation of mixture of ursolic acid, oleanolic acid and betulin (*Dokl. Bulg. Akad. Nauk* 1993, *46*, 119; *Chem. Abstr.* 1994, *121*, 297133 k).

CLITORIA (Papilionaceae)

C. ternatea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 202).

Six new anthocyanins - ternatins A1, A2, B1, B2, D1 and D2 - isolated from flowers and their structures established (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1989, 31st, 324; *Chem. Abstr.* 1990, *112*, 155188 x; *Phytochemistry* 1990, *29*, 949); structure of ternatin D1 established as 3-O-(6-O-malonyl-β-D-glucopyranosyl)-3',5'-di-O-(6-O-(E-4-O-(6-O-E-p-coumaryl-β-D-glucosyl)-p-coumaryl)-β-D-glucopyranosyl)delphinidin (*Tetrahedron Lett.* 1989, *30*, 5305); three trypsin inhibitors isolated from seeds and partially characterised (*J. Sci. Food Agric.* 1992, *58*, 55; *Chem. Abstr.* 1992, *116*, 170244 p).

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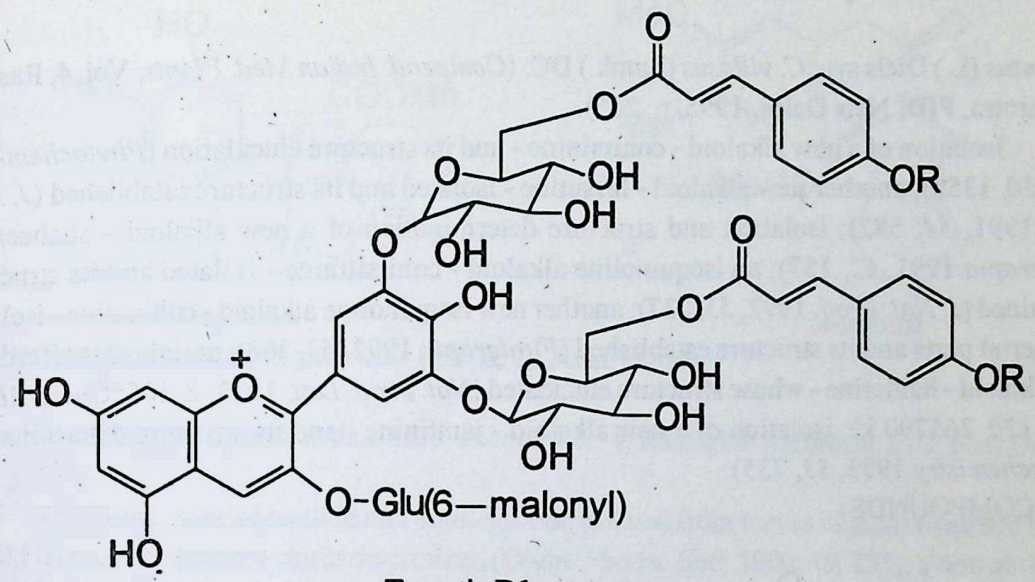

Ternatin D1
R = Glu(6-O-p-Coumaryl)

CNICUS (Asteraceae)

C. arvensis Hoffm.; see *Cirsium arvense* (L.) Scop.

CNIDIUM (Apiaceae)

C. monnieri (L.) Cusson syn. *Seseli daucifolium* Clarke, *Selinum monnieri* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 203).

Osthol , bergapten, isopimpinellin, xanthotoxin, O-acetylcolumbianetin, columbianadin, cniforin A and edultin isolated (*Zhongguo Yaoke Daxue Xuebao* 1991, *22,* 345; *Chem. Abstr.* 1992, *116,* 159024 w).

COCCINIA (Cucurbitaceae)

C. cordifolia Cogn.; see *C. grandis* (L.) Voigt

C. grandis (L.) Voigt syn. *C. cordifolia* Cogn., *C. indica* Wt. & Arn., *Cephalandra indica* Naud. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 204).

Oral administration of pectin (0.2 g/100 g/day) from fruits produced significant hypoglycaemia in normal rats and increase in liver glycogen due to pronounced glycogen synthetase activity (*Planta Med.* 1993, *59,* 330).

C. indica Wt. & Arn.; see *C. grandis* (L.) Voigt

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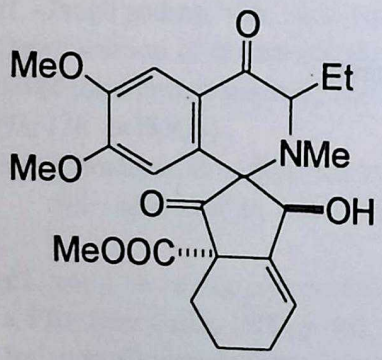
COCCULUS (Menispermaceae)

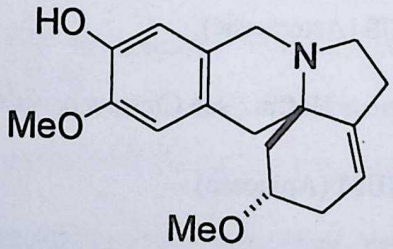
C. hirsutus (L.) Diels syn. *C. villosus* (Lamk.) DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 205).

Isolation of a new alkaloid - cohirsinine - and its structure elucidation (*Phytochemistry* 1991, *30,* 1350); another new alkaloid - hirsutine - isolated and its structure established (*J. Nat. Prod.* 1991, *54,* 582); isolation and structure determination of a new alkaloid - shaheenine (*Fitoterapia* 1991, *62,* 157); an isoquinoline alkaloid - cohirsitinine - isolated and its structure determined (*J. Nat. Prod.* 1992, *55,* 237); another new isoquinoline alkaloid - cohirsitine - isolated from aerial parts and its structure established (*Fitoterapia* 1992, *63,* 308); aerial parts afforded a new alkaloid - haiderine - whose structure elucidated (*Nat. Prod. Lett.* 1993, *2,* 105; *Chem. Abstr.* 1994, *120,* 265790 k); isolation of a new alkaloid - jamtinine - and its structure determination (*Phytochemistry* 1993, *33,* 735).

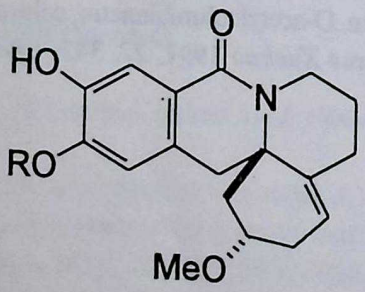
NEW COMPOUNDS



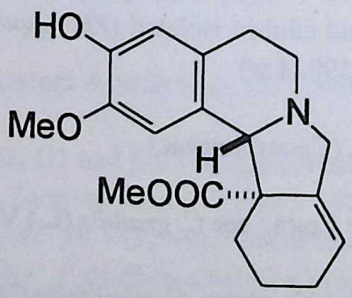
Cohirsitine



Cohirsitinine



Cohirsinine
R = Me
Shaheenine
R = H



Hirsutine

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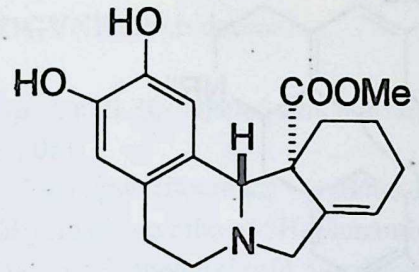
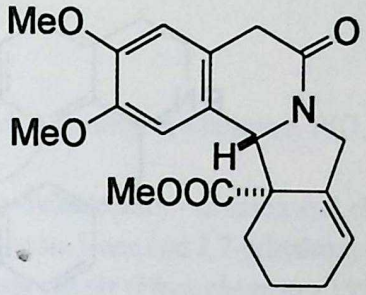


Haiderine



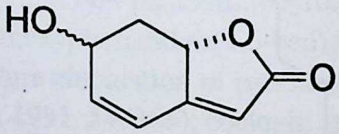
Jamtinine

C. laeba (Delile) DC.; see *C. pendulus* (J.R. & G. Forst.) Diels

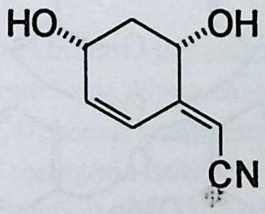
C. laurifolius DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 205).

Coclauril, menisdaurilide and aquilegiolide isolated from leaves of plant collected from Ishigaki Island and their structures determined (*Chem. Pharm. Bull.* 1990, *38,* 225); a new alkaloid - cocclafine - isolated in yield of 0.001% from leaves along with isoboldine (0.0016), cocculine (0.001) and norisoboldine (0.0006%); structure and absolute configuration of new compound established (*Khim. Prir. Soedin.* 1991, 84; *Chem. Abstr.* 1992, *117,* 86645 h).

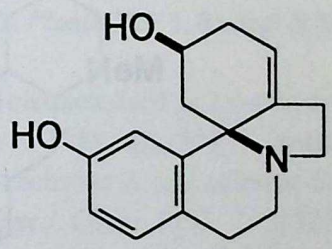
NEW COMPOUNDS



Aquilegiolide
~~ = β
Menisdaurilide
~~ = α



Coclauril



Cocclafine

C. macrocarpus Wt. & Arn.; see *Diploclisia glaucescens* (Bl.) Diels

C. pendulus (J.R. & G. Forst.) Diels syn. *C. laeba* (Delile) DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 206).

Six new alkaloids - N-norcocsulinin, cocsilinine, cocsiline, O-methylcocsulinin, nortrilobine and pendulinine - isolated from leaves and stems and their structures elucidated; trilobine, O,O-dimethylcocsulinin, tetrandrine and isotrilobine also isolated (*Fitoterapia* 1991, *62,* 391); isolation of hernandezine, tetrandrine, penduline, cocsuline and punjabine from leaves and stems (*Planta Med.* 1993, *59,* 276).

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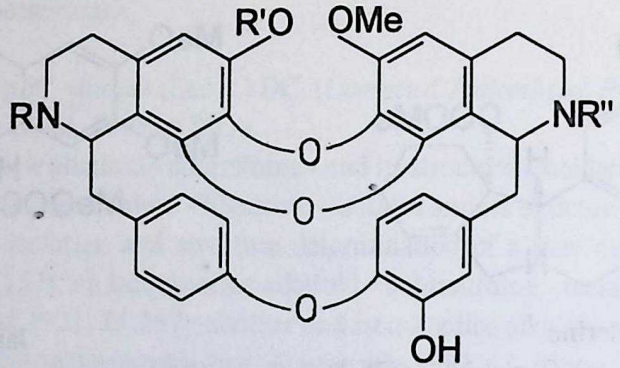
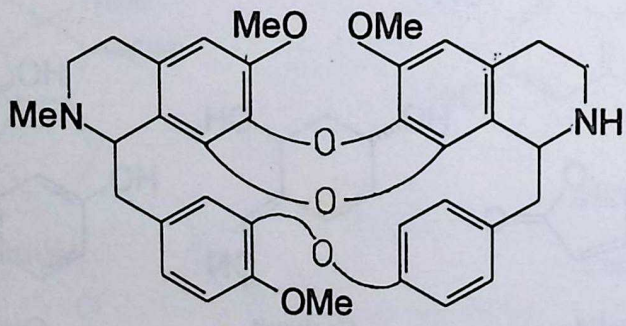
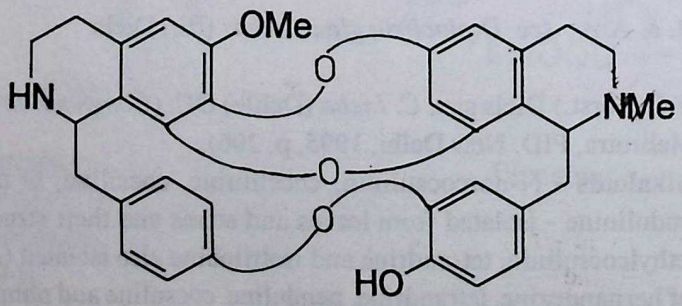


Cocsiline
R,R' = Me, R" = H
Cocsilinine
R,R',R" = H
N-Norcocsulinin
R = Me, R',R" = H
O-Methylcocsulinin
R,R',R" = Me



Pendilinine



Nortrilobine

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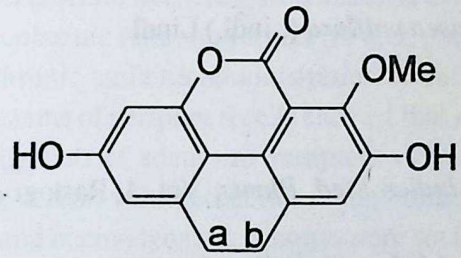
C. villosus (Lamk.) DC.; see *C. hirsutus* (L.) Diels

COELOGYNE (Orchidaceae)

C. flaccida Lindl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 208).

Two new stilbenoids - isoflaccidinin and iso-oxoflaccidin - isolated and characterised as 2,7-dihydroxy-6-methoxy-5H-phenanthro[4,5-bcd]pyran-5-one and 2,7-dihydroxy-6-methoxy-9,10-dihydro-5H-phenanthro[4,5-bcd]pyran-5-one respectively (*Phytochemistry* 1991, *30,* 971).

NEW COMPOUNDS



Isoflaccidinin

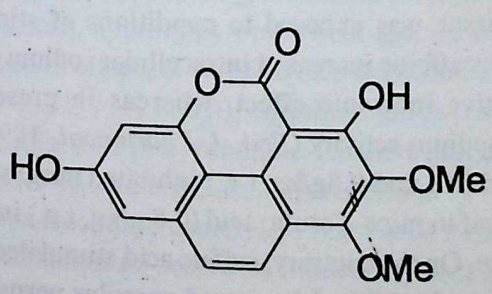
ab = Δ

Iso-oxoflaccidin

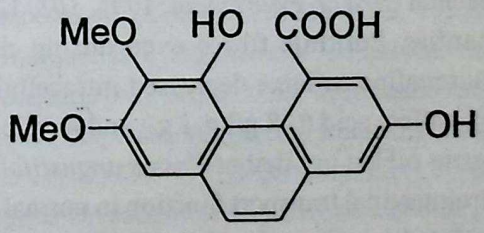
C. nitida Lindl. syn. *C. ochracea* Lindl. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 189).

A new phenanthropyrone - ochrolide - isolated and characterised as 2,6-dihydroxy-7,8-dimethoxyphenanthro(4,5-bcd)pyran-5-one (*Phytochemistry* 1989, *28,* 3545); isolation and structure elucidation of two new 1,4-phenanthraquinones - ochrone A and ochrone B (*J. Nat. Prod.* 1991, *54,* 386); coelogin and coeloginin isolated (*Indian J. Chem.* 1992, *31*B, 133); a new phenanthrene derivative - ochrolic acid - isolated and its structure determined (*Phytochemistry* 1994, *36,* 1515).

NEW COMPOUNDS



Ochrolide



Ochrolic acid

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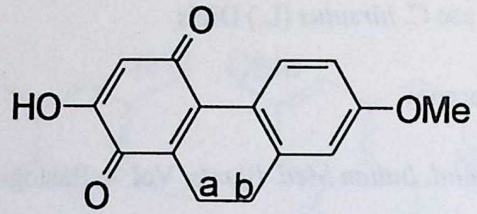

Ochrone A
Ochrone B
ab = Δ

C. ochracea Lindl.; see *C. nitida* Lindl.

C. uniflora Lindl.; see *Panisea uniflora* (Lindl.) Lindl.

COFFEA (Rubiaceae)

C. arabica L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 209).

A new diterpene - 16-O-methylcafestol - along with cafestol and kahweol identified in beans by HPLC (*Z. Lebensm.-Unters. Forsch.* 1989, *189,* 326; *Chem. Abstr.* 1990, *112,* 75404 z); 16-O-methylcafestol, kahweol and cafestol contents of raw and roasted beans studied by GC and HPLC (*Dtsch. Lebensm. Rundsch.* 1989, *85,* 381; *Chem. Abstr.* 1990, *112,* 177236 p); green beans contained 6.4% total chlorogenic acids; of these, 5-O-caffeoylquinic acid constituted 49.8%; after roasting 4-O-feruloyl-5-O-caffeoylquinic acid and 4-O-caffeoyl-5-O-feruloylquinic acid disappeared in beans (*Wakayama Daigaku Kyoibugakubu Kiyo Shizen Kagaku* 1989, 33; *Chem. Abstr.* 1990, *112,* 75559 d); isolation of ursolic acid from leaves (*Collog. Sci. Int. Cafe* 14th 1991, 245; *Chem. Abstr.* 1992, *116,* 252151 v).

BIOLOGICAL ACTIVITY

Caffeine (0.1 g) increased variability of heart rate in ten healthy women irrespective of their vegetative and hormonal status (*Farmakol. Toksikol.* 1991, *54,* 28; *Chem. Abstr.* 1992, *116,* 493 b); pretratment with caffeine (0.01 M) protected rat isolated atrial myocardium against rise in end-diastolic $[Ca]_e$ which occurred when tissue was exposed to conditions of stimulated ischaemia (*Brit. J. Pharmacol.* 1991, *103,* 1225); caffeine increased intracellular sodium activity in cardiac Purkinje fibres even during negative inotropic effect, whereas in presence of noradrenaline caffeine decreased intracellular sodium activity (*Brit. J. Pharmacol.* 1994, *113,* 289); caffeic acid (0.8 g/kg, i.g.) and ferulic acid (0.4 and 0.8g/kg, i.g.) inhibited purging effect of castor oil but nor that of *Cassia angustifolia* leaf in mice. Ferulic acid (0.8 g/kg, i.g.) inhibited gastrointestinal transport function in normal mice. On the contrary, caffeic acid stimulated action of isolated jejunum of rabbit. However, caffeic acid inhibited increased vascular permeability induced by acetic acid in mice and oedema of hind paw (*Tianran Chanwu Yanjiu Yu Kaifa* 1991, *3,* 40; *Chem. Abstr.* 1991, *115,* 541 v).

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Caffeine (0.1 - 50.0 mM) produced no contraction in myometrial muscle cells with intact plasmalemmal of pregnant rat. At (0.1 - 10.0 mM) it inhibited contractions induced by electrical stimulation, potassium-rich (60.0 mM K^+) solution or oxytocin (22.5 nM). Result suggest that inability of caffeine to cause spasm of rat myometrium is due to absence of caffeine-sensitive calcium release channel in sarcoplasmic reticulum (*Brit. J. Pharmacol.* 1990, *99,* 261); caffeine inhibited forskolin-stimulated cAMP accumulation in slices of rat cerebral cortex, IC50 for inhibition being 21.0 μM. Caffeine (200.0 μM) almost completely blocked forskolin response (*Eur. J. Pharmacol.* 1990, *175,* 203); exposure to caffeine (10.0 mM) reduced tail currents in guinea pig ventricular myocytes associated with very abbreviated (12 ms duration) action potentials and greatly reduced difference between first and steady state tail currents at this action potential duration. Action of caffeine on calcium-activited tail currents is consistent with dose-dependent leakage of calcium from sarcoplasmic reticulum stores (*Brit. J. Pharmacol.* 1990, *101,* 399).

Study of effect of chronic caffeine administration to rats on A2- and A1-adenosine receptor-adenylate cyclase systems of peripheral cells showed that response of some, but not all, types of peripheral cells to agonists of adenosine receptors were altered (*J. Pharmacol. Exp. Ther.* 1990, *254,* 757); young human volunteers after 7-days caffeine-free period received oral doses of caffeine (250.0 mg) and haemodynamic changes were studied at 0, 30, 60, 120 and 180 min. At 30 min, rise in blood pressure and decreased in baroreflex slope were observed but heart rate remained unchanged (*Clin. Pharmacol. Ther.* 1990, *48,* 568; *Chem. Abstr.* 1991, *114,* 114941 k).

Caffeine (0.1 - 10.0 mM) produced biphasic effect on Na^+ - K^+ ATPase activity in rat heart sarcolemmal preparations; activity being stimulated by about 25% at low concentrations (0.1 - 1.0 mM) and inhibited at higher concentrations (10.0 mM) of caffeine; Na^+ -induced Ca^{++} release from sarcolemmal vesicles was stimulated by caffeine. Results indicated that contractile effects of caffeine may be related to Ca^{++} movements at sarcolema level in heart (*J. Pharmacol. Exp. Ther.* 1990, *25,* 1188). Caffeine (1.0 - 6.0 mM) induced endothelium-independent phasic contractile responses in isolated rabbit renal artery ring preparation. Nifedipine (10.0 μM), a L-type calcium channel blocker, had no effect and high concentration of verapamil and diltiazem (10.0 - 30.0 μM) had only slight effect upon these responses (*Eur. J. Pharmacol.* 1991, *196,* 307); caffeine enhanced glutathione conjugate production in rat microsomes but not in mouse microsomes, apparently because of species defference. This partly explains species difference observed in effects of caffeine on paracetamol hepatotoxicity (*Xenobiotica* 1992, *22,* 433; *Chem. Abstr.* 1992, *117,* 266 a); caffeine induced rapid increase in cystosolic Ca^{++} in porcine adrenal chromaffin cells in a ryanodine-sensitive manner. Caffeine pretreatment also eliminated nicotinic responses but did not elevate extracellular K^+- induced response, suggesting that caffeine blocks nicotinic receptor channels (*J. Pharmacol. Exp. Ther.* 1993, *264,* 770); inhibitory effect of caffeine on catecholamine secretion induced by secretagogues investigated in perfused adrenal glands and dispersed chromaffin cells of guinea pig. Caffeine inhibited evoked catecholamine secretion through blockade of voltage-dependent Na^+ and Ca^{++} channels and acetylcholine receptors (*Brit. J. Pharmacol.* 1994, *111,* 935); caffeine increased output of prostaglandin PGF2α, PGE2 and 6-

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keto-PGF1α from guinea pig uterus on days 7 and 15 of oestrous cycle, but there was no effect on PGE2 output in pigs less than 4 months old (*Brit. J. Pharmacol.* 1994, *113,* 103).

C. robusta Linden (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 200).

Isolation of 16-O-methylcafestol and its structure confirmation by synthesis (*Z. Lebensm. -Unters. Forsch.* 1989, *189,* 219; *Chem. Abstr.* 1990, *112,* 157019 s); 16-O-methylcafestol, kahweol and cafestol contents of raw and roasted beans studied by GC and HP1C (*Dtsch. Lebensm. Rundsch.* 1989, *85,* 381; *Chem. Abstr.* 1990, *112,* 177236 p); green beans contained 9.8% total chlorogenic acids; of these, 5-O-caffeoylquinic acid constituted 67.7%; after roasting 4-O-feruloyl-5-O-caffeoylquinic acid and 4-O-caffeoyl-5-O-feruloylquinic acid disappeared in beans (*Wakayama Daikagu Kyoikugakubu Kiyo Schizen Kagaku* 1989, 33; *Chem. Abstr.* 1990, *112,* 75559 d).

BIOLOGICAL ACTIVITY

Administration of 2-O-(2-O-isovaleryl-β-D-glucopyranosyl)atractyligenin produced initial hyperglycaemia followed by marked hypoglycaemia with typical convulsions, acidosis and coma. Two hr. later depletion of hepatic and muscular glycogen was observed. 2-O-β-D-Glucopyranosyl-atractyligenin showed a different behavior, statistically significant fall in glucose blood levels and in hepatic and muscular glycogen stores; acidosis and convulsions were not observed (*Pharmacol. Res.* 1993, *27* (1 Suppl.), 35; *Chem. Abstr.* 1993, *119,* 108938 b).

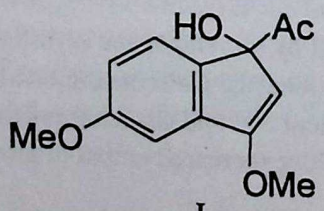
COIX (Poaceae)

C. lacryma-jobi L. var. *ma-yuen* (Romanet) Stapf ex Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 210).

Methanolic extract of etiolated seedlings exhibited antimicrobial activity (*Nippon Nogei Kagaku Kaishi* 1993, *67,* 1405; *Chem. Abstr.* 1994, *120,* 129489 s); seed extract showed antitumor activity *in vivo* on transplantable mouse tumor (*Planta Med.* 1994, *60,* 356).

Isolation of two new antimicrobial compounds - coixindens A and B - from seedlings and their characterisation as 3,5-dimethoxy-1H-inden-1-one and 1-acetyl-1-hydroxy-3,5-dimethoxy-1H-indene (*Nippon Nogei Kagaku Kaishi* 1993, *67,* 1405; *Chem. Abstr.* 1994, *120,* 129489 s); a new compound (I) isolated from seedlings and its structure determined (*Chem. Lett.* 1993, 1139; *Chem. Abstr.* 1994, *120,* 4582 k); isolation of palmitic, stearic, oleic and linoleic acids from seeds (*Planta Med.* 1994, *60,* 356).

NEW COMPOUNDS



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BIOLOGICAL ACTIVITY

Coixinden B exhibited activity against bacteria but not against yeast or fungi whereas coixinden A showed activity against bacteria as well as fungi (*Nippon Nogei Kagaku Kaishi* 1993, *67,* 1405; *Chem. Abstr.* 1994, *120,* 129489 s); compound I showed activity against bacteria (*Chem. Lett.* 1993, 1139; *Chem. Abstr.* 1994, *120,* 4582 k).

COLA (Sterculiaceae)

C. nitida (Vent.) Cheval. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 118).

Aqueous and alcoholic extracts of bark inhibited growth of *Staphylococcus aureus, Klebsiella pneumoniae, Proteus mirabilis, Pseudomonas aeruginosa, Escherichia coli and Neisseria gonorrhoeae* (*J. Appl. Bacteriol.* 1991, *71,* 398; *Chem. Abstr.* 1992, *116,* 91208 b).

COLCHICUM (Liliaceae)

C. luteum Baker (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 210).

Regiocontrolled total synthesis of colchicine (*Stud. Nat. Prod. Chem.* 1989, 287; *Chem. Abstr.* 1990, *112,* 21171 c; *Chem. Commun.* 1992, 974); absolute configuration of (–)colchicine determined (*FEBS Lett.* 1990, *262,* 5; *Chem. Abstr.* 1990, *113,* 97860 t); isolation of colchicine, 2-demethylcolchicine, colchamine. cornigerine and β-lumicolchicine from corms of flowering plant (*Khim. Prir. Soedin.* 1991, 731; *Chem. Abstr.* 1992, *117,* 108224 z).

COLEUS (Lamiaceae)

C. barbatus (Andr.) Benth.; see *C. forskohlii* (Willd.) Briq.

C. forskohlii (Willd.) Briq. syn. *C. barbatus* (Andr.) Benth., *Plectranthus barbatus* Andr. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 211).

Forskolin synthesised (*Chem. Commun.* 1989, 512; *Tetrahedron* 1989, *45,* 5215; *Farmaco* 1991, *46,* 1281; *Chem. Abstr.* 1992, *116,* 194620 j); a new diterpene isolated from stems and characterised as 9(10→20)-abeo-abieta-8,11,13-trien-10β,11,12-triol (I) (*Bull. Soc. Chim. Belg.* 1989, *98,* 413; *Chem. Abstr.* 1990, *112,* 52233 d); isolation of coleonol B, 1α,6β,7α-triacetylcoleonol B, 1-acetylforskolin and deacetylforskolin from flowers (*Tianran Chanwu Yanjiu Yu Kaifa* 1990, *2,* 6; *Chem. Abstr.* 1991, *115,* 25975 c); isolation of a new triterpenoid - coleonolic acid - from roots and its characterisation as 2-hydroxymethyl A(1)nor-urs-19α-hydroxy-2(3),12(13)-dien-28-oic acid; its stereostructure also determined (*Tetrahedron Lett.* 1990, *31,* 3467); structure of coleonol B revised by X-ray studies (*Z. Kristallogr.* 1991, *194,* 229; *Chem. Abstr.* 1991, *115,* 232554 e); a new phenolic glycoside - coleoside B - isolated and characterised

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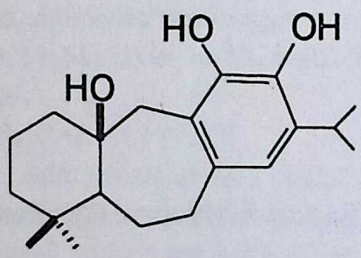
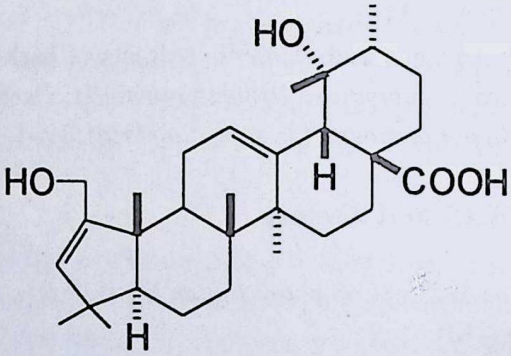
as 1-isopropylcatechol-4-O-β-D-glucosyl(1→2)-β-D-galactopyranoside (*Pharmazie* 1991, *46*, 157; *Chem. Abstr.* 1991, *115*, 25985 f); a new antihypertensive labdane diterpenoid - 13-epi-9-deoxycoleonol (13-epi-9-deoxyforskolin) - isolated and its stereostructure determined (*Bioorg. Med. Chem. Lett.* 1992, *2*, 249; *Chem. Abstr.* 1993, *119*, 91254a); conformational analysis of forskolin (*Bull. Soc. Chim. Fr.* 1992, *130*, 501; *Chem. Abstr.* 1994, *120*, 192031 b); isolation of two new diterpenes - 1,9-dideoxycoleonol B and 1-acetoxycoleosol - from roots and their structure elucidation (*Phytochemistry* 1993, *34*, 1577).

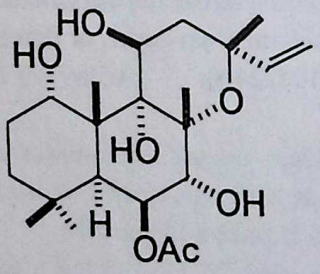
NEW COMPOUNDS



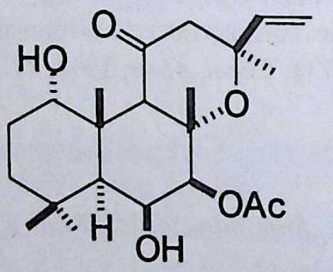
I



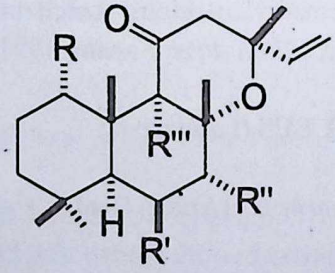
Coleonolic acid



Coleonol B



13-Epi-9-deoxycoleonol B



1,9-Dideoxycoleonol B
R,R''' = H, R' = OAc, R'' = OH
1-Acetoxycoleosol
R = OAc, R',R''' = OH, R'' = H

BIOLOGICAL ACTIVITY

Internal infusion of forskolin (0.2 μg/kg/min) in anaesthetised dog increased renal bood flow (RBF) and glomerular filteration rate (GFR) to same degree. It also increased urine flow and urinary sodium excretion. Increase in RBF and GFR may be due to preferential action of forskolin in dilating afferent arteriole (*Jap. J. Pharmacol.* 1991, *55*, 161); effect of forskolin on teratogenicity of ephedrine in embryonal chick heart studied; 4-day chick embryos administered forskolin (1.0 nmol) together with ephedrine (0.5 or 5.0 μ mol) were examined for malformation on day 14 of incubation. Frequency of malformed embryos increased three-fold. Forskolin (1.0

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nmol) alone did not induce cardiac malformation, and increase in cAMP through stimulation of adenylate cyclase by forskolin may be associated with potentiation of ephedrine-induced cardiovascular malformation (*Toxicol. Lett.* 1991, *56,* 145; *Chem. Abstr.* 1991, *114,* 240508 n).

C. zeylanicus (Benth.) Cramer syn. *Plectranthus zeylanicus* Benth.

Isolation and structure elucidation of two new abietane type diterpenoids - 7β-acetoxy-6β-hydroxyroyleanone and 7β,6β-dihydroxyroyleanone - along with 7α-acetoxy-6β-hydroxyroyleanone (*Phytochemistry* 1989, *28,* 3135).

Distribution: Introduced into India, grown in gardens of south India.

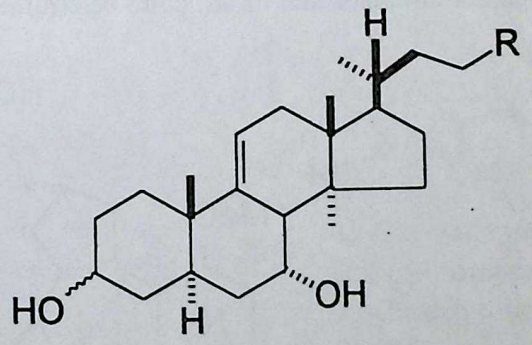
COLOCASIA (Araceae)

C. antiquorum Schott; see *C. esculenta* (L.) Schott

C. esculenta (L.) Schott syn. *C. antiquorum* Schott (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 74).

Isolation of phytoalexin - 9,12,13-trihydroxy-10(E)-octadecenoic acid - from tubers inoculated with *Ceratocystis fimbriata* (*Phytochemistry* 1989, *28,* 2613); two new dihydrosterols - 14α-methyl-5α-cholesta-9,24-dien-3β,7α-diol (I) and 14α-ethyl-24-methylene-5α-cholesta-9,24-dien-3α,7α-diol (II) isolated from tubers and their structures determined (*Indian J. Pharm. Sci.* 1991, *53,* 98); isolation of five new aliphatic compounds - tetracos-20-en-1,18-diol, 25-methyltriacontan-10-one, octacos-10-en-1,2-diol, pentatetratriacont-1,7-dien-12-ol and 25-methyltritriacont-21-en-1,9,11-triol - from tubers and their structure elucidation; nonacosane, cyanidin-3-glucoside, β-sitosterol and stigmasterol also isolated (*J. Indian Chem. Soc.* 1992, *69,* 887).

NEW COMPOUNDS



I

R = CH=CMe$_2$, ~~ = β

II

R = C(CH$_2$)CHMe$_2$, ~~ = α

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BIOLOGICAL ACTIVITY

9,12,13-Trihydroxy-10(E)-octadecenoic acid at 50 ppm completely inhibited spore germination of *Ceratocystis fimbriata* (*Phytochemistry* 1989, *28,* 2613).

CONIUM (Apiaceae)

C. maculatum L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 119).

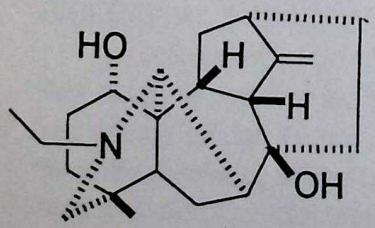
Enantiospecific synthesis of (+)conhydrine (*Tetrahedron Lett.* 1989, *30,* 6395).

CONSOLIDA (Ranunculaceae)

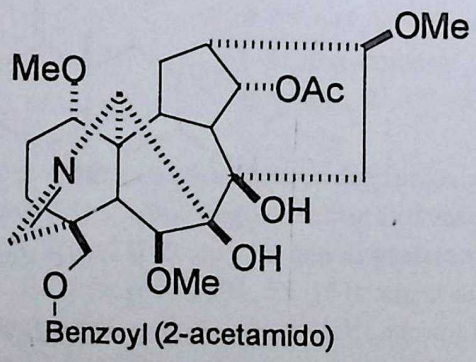
C. ambigua (L.) Ball. & Heywood syn. *Delphinium ajacis* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 216).

Two new norditerpenoid alkaloids - 19-oxo-anthranoyllycoctonine and 19-oxodelphatine - isolated from stems and their structures elucidated; in addition, browniine, delphatine, delictine, 14-deacetylambiguine, deltatsine, takaosamine and 18-methoxygadesine isolated; delsoline, delcosine, anthranoyllycoctonine, deltaline, delpheline and gigactonine also isolated from stems and leaves (*J. Nat. Prod.* 1991, *54,* 1283); isolation of two new norditerpenoids - ajadelphine and ajadelphinine - from roots and their structure determination; roots also afforded delcosine, delsoline, deltaline, gigactonine, 18-methoxygadesine and delphisine (*J. Nat. Prod.* 1992, *55,* 736; *ibid.* 1994, *57,* 677); crystal structure of delsoline determined (*J. Crystallogr. Spectrosc. Res.* 1992, *22,* 477; *Chem. Abstr.* 1992, *117,* 151190 x); four new norditerpenoid alkaloids - delajacine, delajacirine, delajadine and ajanine - isolated from leaves and their structures elucidated; delajacirine partially synthesised (*J. Nat. Prod.* 1993, *56,* 2098); isolation of a new diterpenoid - ajabicine - and its structure determination (*Tetrahedron Lett.* 1993, *34,* 1441); a new norditerpenoid alkaloid - ajadinine - isolated from seeds and its structure determined (*J. Nat. Prod.* 1994, *57,* 677).

NEW COMPOUNDS



Ajabicine



Ajadinine

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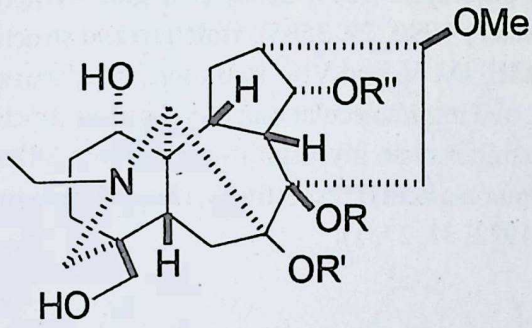
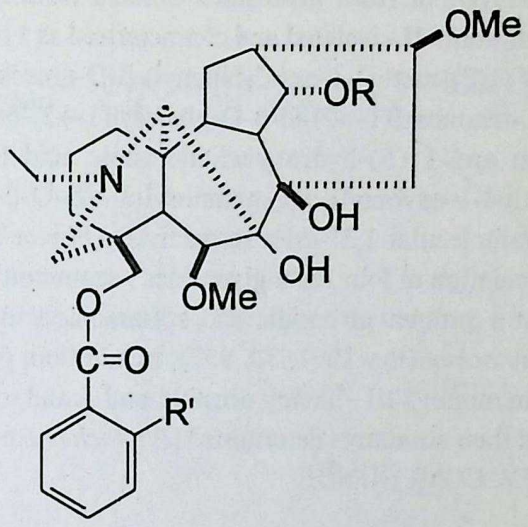
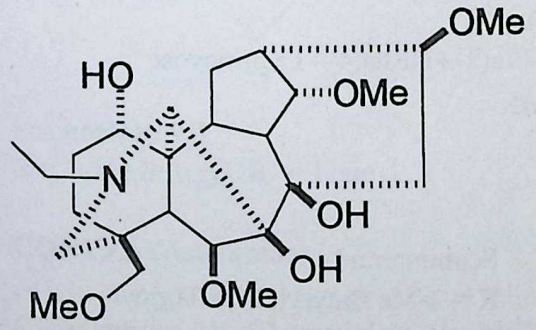


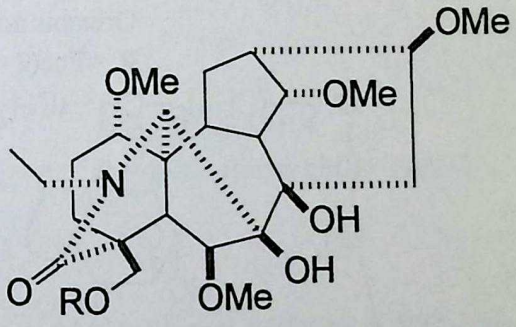
Ajadelphine
R = Me, R' = H, R" = Ac
Ajadelphinine
RR' = $-CH_2-$, R" = H



Ajanine
R = COC(Me)(OH)Et, R' = NHAc
Delajacine
R = Me, R' = NHCOCH(Me)Et
Delajacirine
R = Me, R' = $NHCOCHMe_2$
Delajadine
R = Ac, R' = NHCOCH(Me)Et



Delsoline



19-Oxo-anthranoyllycoctonine
R = o-Aminobenzoyl
19-Oxodelphatine
R = Me

CONVOLVULUS (Convolvulaceae)

C. scammonia L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 76).

Scammonic acid A, isobutyric, 2(S)-methylbutyric and tiglic acids obtained by alkaline

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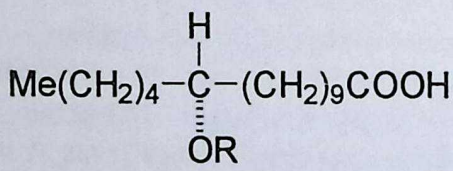
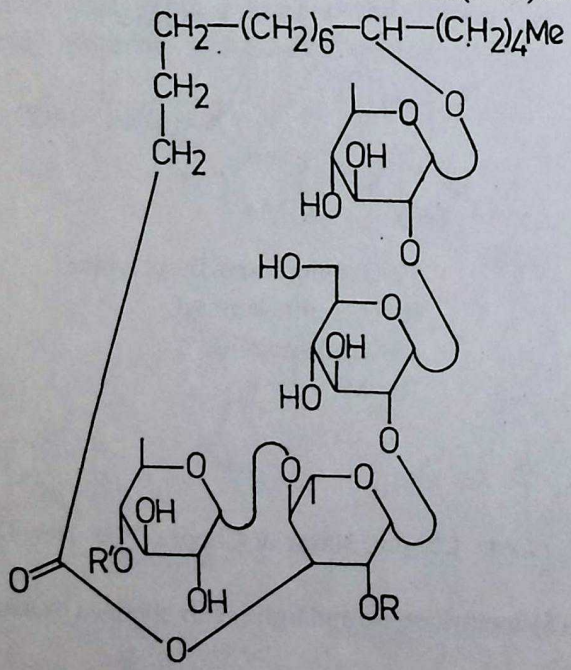
hydrolysis of resin glycosides isolated from roots; two resin glycosides - scammonin I and scammonin II - isolated and characterised as 11(S)-hydroxyhexadecanoic acid-11-{[O-6-deoxy-4-O-(2(E)-methyl-1-oxy-2-butenyl)-β-D-glucosyl(1→4)-O-6-deoxy-2-O-(2-methyl-1-oxybutyl)-α-L-mannosyl(1→2)-O-β-D-glucosyl(1→2)-6-deoxy-β-D-glu-cosyl]oxy}-intramolecular 1,3"-ester and 11(S)-hydroxyhexadecanoic acid-11-{[O-β-D-glucosyl(1→4)-O-6-deoxy-2-O-(2-methyl-1-oxybutyl)-α-L-mannosyl(1→2)-O-β-D-glucosyl(1→2)-6-deoxy-β-D-glucosyl]oxy}-intramolecular 1,3"-ester respectively (*Phytochemistry* 1990, *29,* 3565); isolation and structure elucidation of four resin glycosides - scammonins III, IV, V, and VI - from roots; all glycosides have a common glycosidic acid, scammonic acid A, and intramolecular macrocyclic ester structure (*Phytochemistry* 1991, *30,* 957); in addition, two minor resin glycosides - scammonin VII and scammonin VIII - having orizabic acid A and scammonic acid B respectively, isolated from roots and their structures determined (*Phytochemistry* 1992, *31,* 2761).

NEW COMPOUNDS



Scammonic acid A
R = Quinovose(2→1)Glu(2→1)Rha(4→1)Quinovose
Scammonic acid B
R = Quinovose(2→1)Glu(2→1)Rha(4→1)Glu
Orizabic acid A
R = Fuc(2→1)Glu(2→1)Rha(4→1)Quinovose



Scammonin I
R = 2-Me Butyryl, R' = Tigloyl
Scammonin II
R = 2-Me Butyryl, R' = H
Scammonin III
R = Isobutyryl, R' = Tigloyl
Scammonin IV
R, R' = Tigloyl
Scammonin V
R = Isobutyryl, R' = H
Scammonin VI
R = Tigloyl, R' = H

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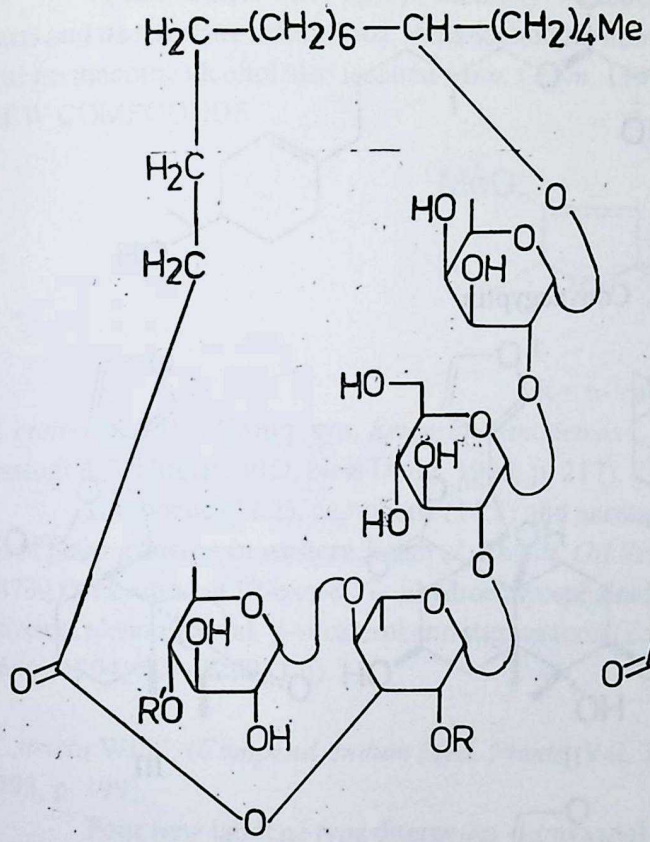
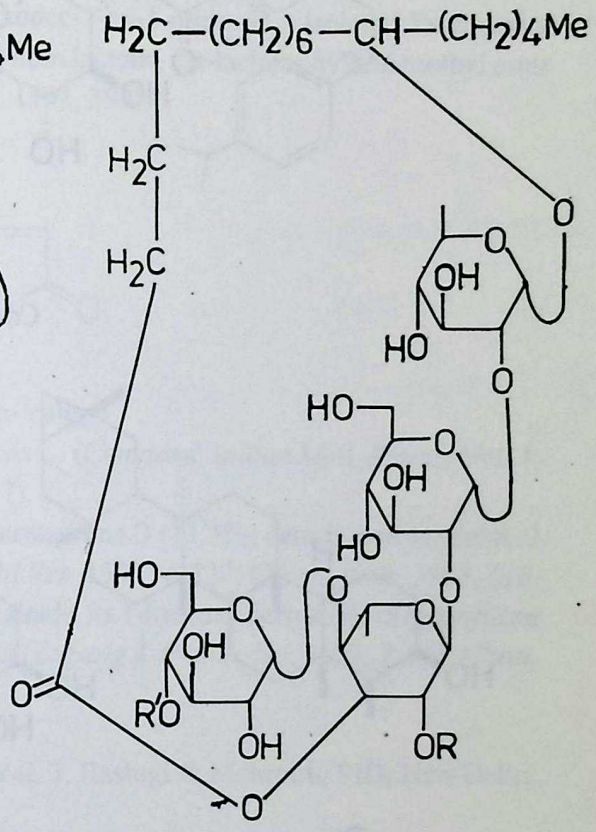


Scammonin VII
R = 2-Me Butyryl, R' = Tigloyl



Scammonin VIII
R = 2-Me Butyryl, R' = Tigloyl

CONYZA (Asteraceae)

C. aegyptiaca Ait. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 216).

A new triterpene (I) isolated along with phytol and its structure determined (*Z. Naturforsch.* 1989, *44*B, 1584; *Chem. Abstr.* 1990, *112*, 175649 b); isolation of a clerodane (II), a seco - derivative (III), two dilactones (IV and V), two xylosides - conyaegyptin and 14-hydroxy-12,13-dihydrosesquiterpineol (VI) and its 14-O-xylopyranoside (VII) from aerial parts and their structure elucidation (*Phytochemistry* 1990, *29*, 3167).

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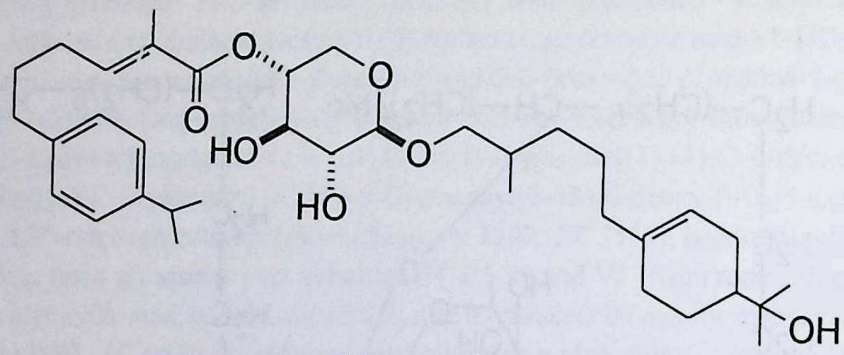
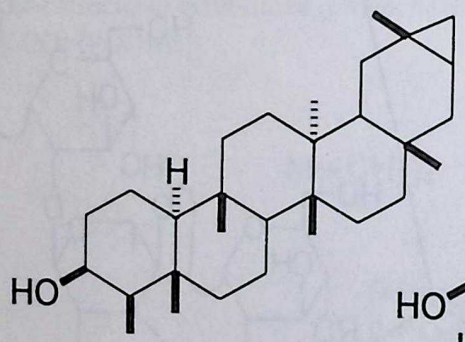
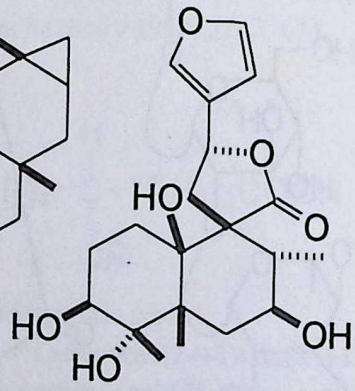


Conyaegyptin



I



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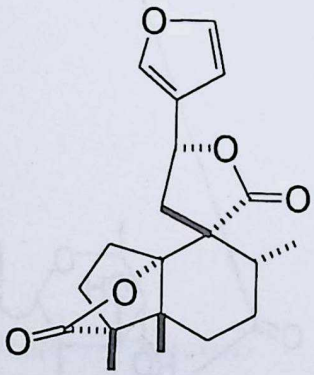

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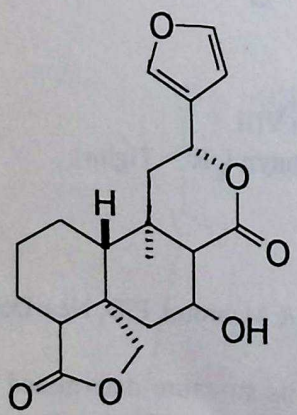

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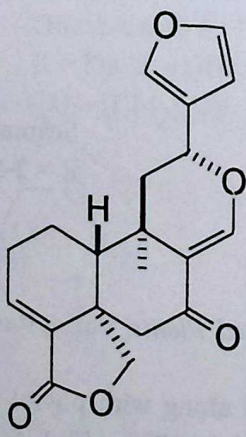

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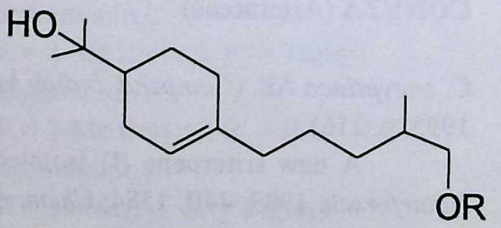

VI
R = H
VII
R = Xyl

C. ambigua DC.; see *C. bonariensis* (L.) Cronq.

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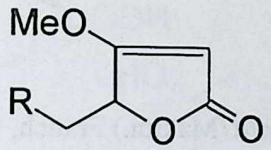
C. bonariensis (L.) Cronq. syn. *Erigeron linifolius* Willd., *Conyza ambigua* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 216).

A new butenolide - (RS)3-methoxy-6-oxodec-2-en-4-olide (I) - isolated from aerial parts and its structure determined; trans-lachnophyllum lactone, cis-lachnophyllum methyl ester and germacrane alcohol also isolated (*Ann. Chem.* 1991, 399).

NEW COMPOUNDS



I

R = n-Valeryl

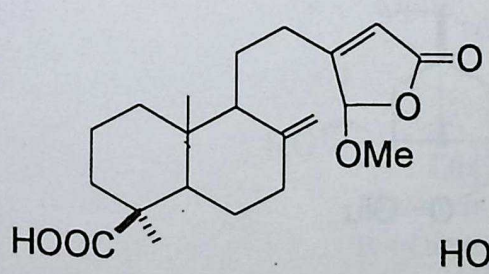
C. canadensis (L.) Cronq. syn. *Erigeron canadensis* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 217).

Limonene (31.2), camphene (14.2) and germacrene D (11.3%) determined in essential oil of plant growing in western Japan (*J. Essent. Oil Res.* 1992, *4,* 227; *Chem. Abstr.* 1993, *118,* 18730 r); isolation of 17-oxo-8,17-dihydroconycephaloide, its 1-hydroxy derivative, caryophyllene epoxide, oleanolic acid, β-sitosterol and stigmasterol (*Zagazig J. Pharm. Sci.* 1993, *2,* 111; *Chem. Abstr.* 1994, *121,* 129911 u).

C. stricta Willd. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 199).

Four new labdane type diterpenes - conyzanol A, conyzanol B, farnesylic acid and 16-methoxy-labda-8(17),13-dien-15,19-dioic acid butenolide (I) - isolated as their methyl esters and their structures elucidated; labda-8(17),13-dien-15,19-dioic acid butenolide and its 16-hydroxy derivative also isolated (*Phytochemistry* 1990, *29,* 2715).

NEW COMPOUNDS



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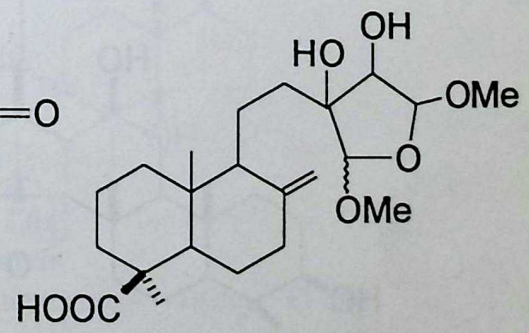

Conyzanol A
~ = α
Conyzanol B
~ = β

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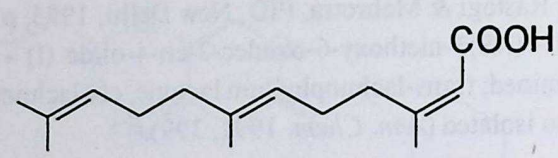


Farnesylic acid

COPTIS (Ranunculaceae)

C. ospricarpa Bruhl; see *Souliea vaginata* (Maxim.) Franch.

C. teeta Wall. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 76).

Palmatine, berberine, epiberberine, jatrorrhizine and fetidine identified in rhizomes (*Zhongguo Zhongyao Zazhi* 1993, *18,* 329; *Chem. Abstr.* 1993, *119,* 199583 w).

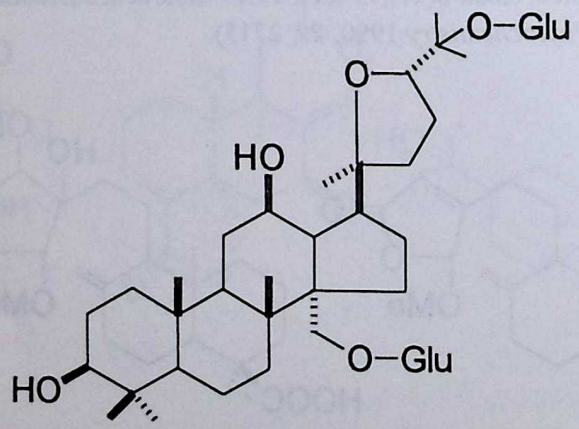
CORCHORUS (Tiliaceae)

C. antichorus Raeusch.; see *C. depressus* (L.) Stocks

C. capsularis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 219).

A new dammarane triterpene glycoside isolated from leaves and characterised as capsugenin-25,30-diglucoside (*J. Nat. Prod.* 1990, *53,* 527).

NEW COMPOUNDS



Capsugenin-25,30-diglucoside

C. depressus (L.) Stocks syn. *C. antichorus* Raeusch. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 219).

Isolation of three new α-amyrin derivatives - cordepressic acid, cordepressenic acid

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and cordepressin - isolated from whole plant and their structures determined; sitosterol, apigenin and luteolin also isolated (*Phytochemistry,* 1991, *30,* 1989).

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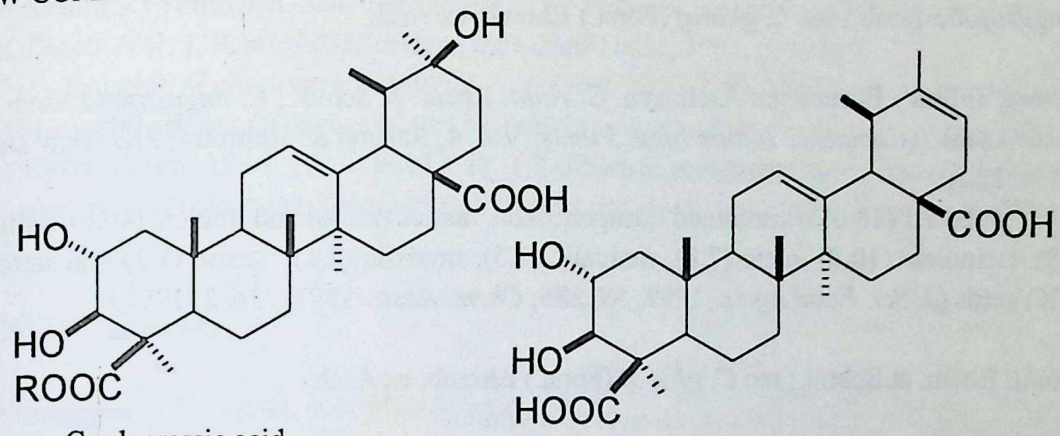

Cordepressic acid
R = H
Cordepressin
R = Glu

Cordepressenic acid

C. olitorius L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 219).

Two new cardiac glycosides - olitoriusin and erysimoside - isolated from seeds and characterised as strophanthidin-3-O-β-D-glucosyl(1→6)-β-D-glucosyl(1→4)-β-D-digitoxoside and strophanthidin-3-O-β-D-glucosyl(1→4)-β-D-digitoxoside respectively; olitoriside and gluco(1→6)-olitoriside also isolated (*J. Chem. Soc.* Perkin 1, 1989, 2065).

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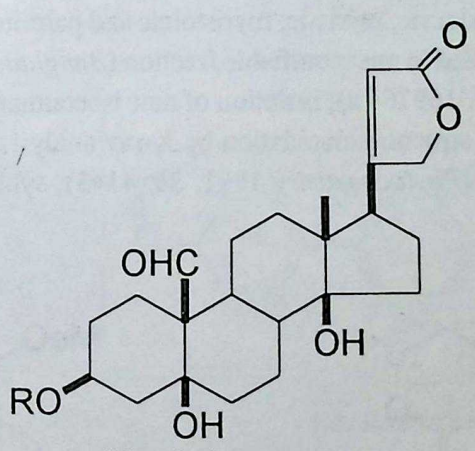

Olitoriusin
R = Digitoxose(4→1)Glu(6→1)Glu
Erysimoside
R = Digitoxose(4→1)Glu
Gluco(1→6)-olitoriside
R = Boivinose(4→1)Glu(6→1)Glu

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CORDIA (Boraginaceae)

C. angustifolia Roxb.; see *C. gharaf* (Forst.) Ehrenb. ex Asch.

C. gharaf (Forst.) Ehrenb. ex Asch. syn. *C. rothii* Roem. & Schult., *C. angustifolia* Roxb., *C. sinensis* Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 220).

Seed oil (18.0%) contained unsaponifiable matter (2.2%) and linoleic (40.0), palmitic (32.8), ricinoleic (10.8), oleic (7.8), malvalic (2.5), myristic (2.4), stearic (2.2) and sterculic (1.5%) acids (*J. Sci. Food Agric.* 1992, *58,* 285; *Chem. Abstr.* 1992, *116,* 231951 r).

C. rothii Roem. & Schult.; see *C. gharaf* (Forst.) Ehrenb. ex Asch.

C. sinensis Lamk.; see *C. gharaf* (Forst.) Ehrenb. ex Asch.

CORIANDRUM (Apiaceae)

C. sativum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 220).

Nonane, C9-16 alkenals, C7-17 alkanals, C10-12 primary alkenols and alkanols identified in fresh green leaves by GC-MS (*J. Agric. Food Chem.* 1990, *38,* 2054; *Chem. Abstr.* 1990, *113,* 208336 y); petroselinic acid (10.7%) determined in seed oil by GC (*Rev. Fr. Corps Gras* 1991, *38,* 109; *Chem. Abstr.* 1991, *115,* 134503 t); palmitic, petroselinic, oleic and linoleic acids as major fatty acids along with lauric, myristic, myristoleic and palmitoleic acids identified in seeds by GLC; β-sitosterol identified in unsaponifiable fraction (*Bangladesh J. Sci. Ind. Res.* 1991, *26,* 33; *Chem. Abstr.* 1992, *117,* 169764 x); isolation of new isocoumarins - coriandrones A and B - from aerial parts and their structure elucidation by X-ray analysis; in addition coriandrin and dihydrocoriandrin isolated (*Phytochemistry* 1991, *30,* 4143); synthesis of coriandrin (*J. Org. Chem.* 1994, *59,* 4735).

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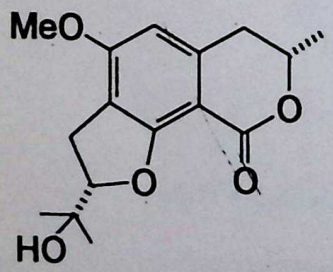
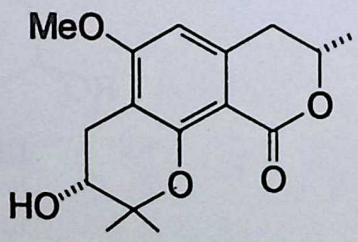


Coriandrone A



Coriandrone B

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CORONOPUS (Brassicaceae)

C. didymus (L.) Smith syn. *Senebiera didyma* (L.) Pers., S. *pinnatifida* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 221).

Isolation of chrysoeriol (*Indian J. Nat. Prod.* 1990, *6*(2), 18; *Chem. Abstr.* 1992, *116,* 148181 u); glucosides of β-sitosterol and rhamnetin isolated (*Acta Farm. Bonaerense* 1993, *12,* 101; *Chem. Abstr.* 1994, *121,* 186931 z); 1,8-dihydroxyanthraquinone, benzyl isocyanate, methylbenzyl sulphide, benzyl cyanide, β-sitosterol and sinapine isolated (*Fitoterapia* 1994, *65,* 181).

CORTIA (Apiaceae)

C. wallichiana (DC.) Leute; see *Selinum candollii* DC.

CORYDALIS (Fumariaceae)

C. flabellata Edgew.

A spirobenzylisoquinoline alkaloid - severzinine - isolated from aerial parts and its ^{13}C-NMR determined; (+)sibiricine also isolated (*J. Nat. Prod.* 1989, *52,* 1027); a dimeric structure for chelidimerine, isolated from roots, proposed on the basis of ^{13}C-NMR studies (*Rev. Latinoam. Quim.* 1990, *21,* 140; *Chem. Abstr.* 1991, *115,* 252145 a).

Distribution: Himalayas, from Kashmir to Nepal, alt. 3000-4000 m.

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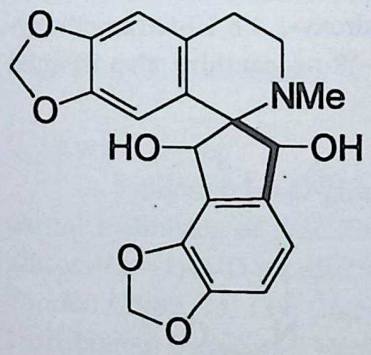
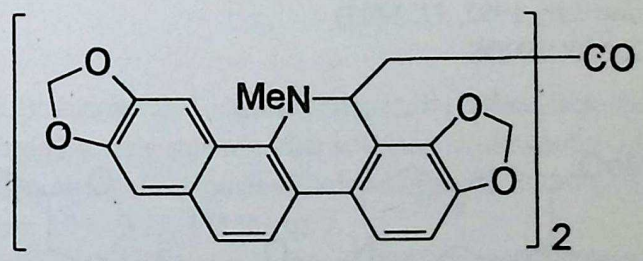


Severzinine



Chelidimerine

C. gortschakovii Schrenk; see *C. thyrsiflora* Prain

C. ramosa Wall.; see *C. vaginans* Royle

C. stewartii Fedde (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 223).

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The alkaloids (+)yenhusomidine, (–)scoulerine, (+)stylopine, cryptopine and (–) sinoacutine isolated (*Planta Med.* 1992, *58,* 108).

C. thyrsiflora Prain syn. *C. gortschakovii* sensu Hook.f. (non Schrenk) (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 203).

Protopine, tetrahydrocoptisine, (–)sinactine, (–)cavidine, (+)bicuculline, (+)corlumine, sibiricine; ochotensine, dihydrosanguinarine, 8-acetonyl-dihydrosanguinarine, (+)adlumidine and fumaramine isolated; structure of fumaramine confirmed (*Yaoxue Xuebao* 1991, *26,* 303; *Chem. Abstr.* 1991, *115,* 26020 z).

Note : This is the currently accepted nomenclature for the taxon, *C. gortschakovii* Schrenk described in Hook.f. *Fl. Brit. India* 1: 125, 1872, and in *Compendium of Indian Medicinal Plants,* Vol. 3, p. 203 and in its earlier volumes.

C. vaginans Royle syn. *C. ramosa* Wall. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 223).

Isolation of stylopine, protopine and bicuculline from stem and bark (*Planta Med.* 1990, *56,* 418).

COSCINIUM (Menispermaceae)

C. fenestratum (Gaertn.) Colebr. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 224).

New protoberberine alkaloids - oxypalmatine, (–)8-oxotetrahydrothalifendine, (–)8-oxo-isocorypalmine and either (–)8-oxothaicanine or (–)8-oxo-3-hydroxy-2,4,8,10-tetramethoxy-berberine (I) isolated from stems of Thai plant; berberine and (–)8-oxocanthine also isolated (*Phytochemistry* 1992, *31,* 1403).

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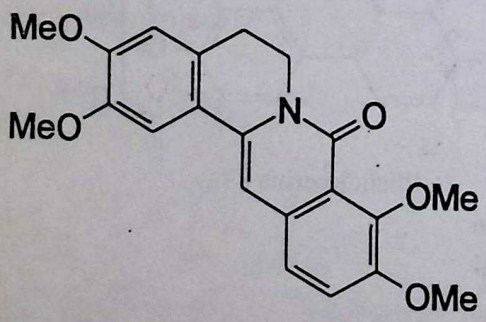
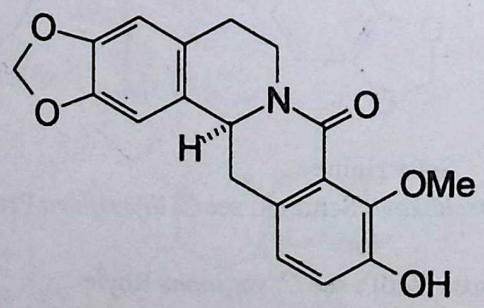


Oxypalmatine



(-)8-Oxotetrahydrothalifendine

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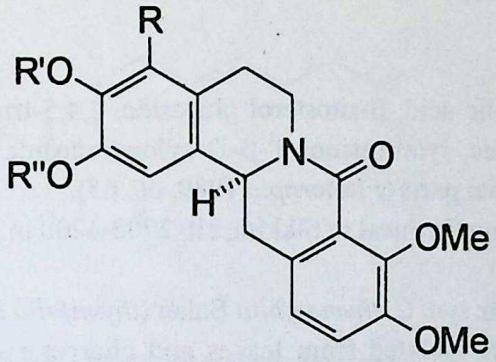

(-)8-Oxo-isocorypalmine
R,R'' = H, R' = Me
(-)8-Oxothaicanine
R = OH, R',R'' = Me
I
R = OMe, R' = H, R'' = Me

COSMOS (Asteraceae)

C. bipinnatus Cav. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 215).

Essential oils of flower heads and leaves exhibited pronounced antimicrobial activity (*Zagazig J. Pharm. Sci.* 1992, *1,* 120; *Chem. Abstr.* 1994, *120,* 330783 b).

COSTUS (Zingiberaceae)

C. lacerus Gagnep.

β-Sitosterol-β-D-glucoside, prosapogenin A, dioscin and gracillin isolated from rhizomes; partial hydrolysis of gracillin afforded a new saponin characterised as diosgenin-3-O-β-D-glucosyl(3→1)-β-D-glucose; acid hydrolysis of rhizomes afforded diosgenin (1.7%) (*J. Sci. Soc. Thailand* 1989, *15,* 139; *Chem. Abstr.* 1990, *112,* 175545 q).

Distribution: Himalayas, Nepal to Sikkim, Meghalaya and Nagaland, alt. 1200-1500 m.

C. sanguineus Donn.

Diosgenin identified in rhizome, aerial tissue, roots and leaves (*Indian J. Pharm. Sci.* 1991, *53,* 251).

Distribution: Native to Central America, introduced in National Botanical Research Institute, Lucknow, India.

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COTONEASTER (Rosaceae)

C. adpressus Boiss.

Isolation of oleanolic acid, β-sitosterol glucoside, 3,4,5-trimethoxyphenol glucoside, quercetin-3-O-β-D-glucoside, lyoniresinol-9'-β-D-xylopyranoside and lyoniresinol-9'-α-L-rhamnopyranoside from aerial parts (*Fitoterapia* 1989, *60,* 65).
Distribution: Himalayas, from Garhwal to Sikkim, alt. 2700-4200 m.

C. integrifolius (Roxb.) Klotz syn. *C. thymaefolia* Baker (*thymifolia & thymifolius*)

A new C-glycoside isolated from leaves and characterised as vitexin-2"-O-α-D-arabinofuranoside; in addition, vitexin, its 2"-O-rhamnoside, rutin, quercetin-3-rhamnoside, 5,7,2',5'-tetrahydroxyflavone and its 7-glucoside also isolated (*Phytochemistry* 1994, *35,* 1381).
Distribution: Himalayas, from Kashmir to Bhutan, alt. 1800-3500 m.

C. thymaefolia Baker; see *C. integrifolius* (Roxb.) Klotz

COTULA (Asteraceae)

C. aurea L.; see *Matricaria aurea* (L.) Boiss.

CRATAEGUS (Rosaceae)

C. oxyacantha L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 226).

(+)Catechin, (–)epicatechin and caffeic acid detected by HPLC (*Farmaco* 1990, *45,* 237; *Chem. Abstr.* 1991, *114,* 12269 e); luteolin, its 7,3'-diglucoside, apigenin, its 7-O-glucoside and rutin detected by HPLC in leaf, bud and flower (*Farmaco* 1990, *45,* 247; *Chem. Abstr.* 1991, *114,* 12270 y).

CRATOXYLUM (CRATOXYLON) (Clusiaceae)

C. cochinchinense (Lour.) Blume syn. *C. polyanthum* Korth., *C. polyanthum* Korth. var. *ligustrinum* Dyer, *C. polyanthum* Korth. var. *wightii* Dyer (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 79).

A new bicyclic triterpenoid (I) isolated from bark and characterised as polypoda-8(26),13,17,21-tetraen-3β-ol; in addition, friedelin, mangostin, β-mangostin, garcinone D, tovophyllin A, 2-geranyl-1,3,6-trihydroxy-4-(3,3-dimethylallyl)xanthone, cratoxylone, δ-tocotrienol, δ-tocotrienol dimer and 5-(γ-tocotrienyl)-γ-tocotrienol isolated (*Phytochemistry* 1993, *32,* 1245).

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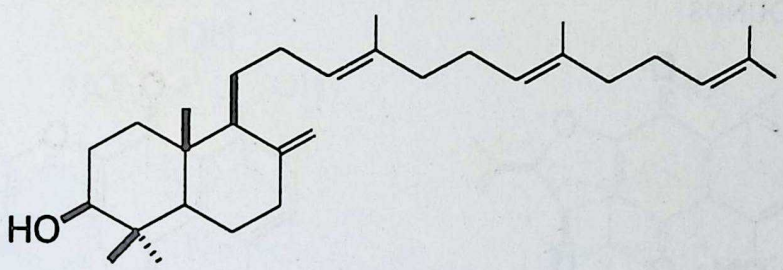

I

Note: *C. formosum* with incorrect author citation has been wrongly treated as synonym under *C. cochinchinense* in *Glossary. C. formosum* (Jack) Dyer is a distinct species.

C. polyanthum Korth.; see *C. cochinchinense* (Lour.) Blume

C. polyanthum Korth. var. *ligustrinum* Dyer; see *C. cochinchinense* (Lour.) Blume

C. polyanthum Korth. var. *wightii* Dyer; see *C. cochinchinense* (Lour.) Blume

CREPIS (Asteraceae)

C. pulchra L. syn. *Phaecasium lampsanoides* Cass.

Four new guaiane-type sesquiterpene lactones - 8-epiisoamberoside, vernoflexuoside, macrocliniside A and diaspanoside A - isolated from roots and characterised; in addition, stigmasteryl-3-O-(6'-O-palmitoyl)-β-D-glucoside isolated (*Pol. J. Chem.* 1994, *68*, 535; *Chem. Abstr.* 1994, *121*, 175134 r).

Distribution: Himalayas, Kashmir and Himachal Pradesh, alt. 2100-2400 m.

CRESCENTIA (Bignoniaceae)

C. cujete L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 80).

Stigmasterol, β-sitosterol, α- and β-amyrins, stearic and palmitic acids, triacontanol, plumieride, aucubin and asperuloside isolated from leaves (*Fitoterapia* 1992, *63*, 476); three new furanonaphthoquinones (I, II and III) isolated and characterised as (2S,3S)3-hydroxy-5,6-dimethoxydehydroiso-α-lapachone, 2(R)5,6-dimethoxydehydroiso-α-lapachone and 2(R)5-methoxydehydroiso-α-lapachone respectively; in addition, 2-(1-hydroxyethyl)naphtho[2,3-b]-furan-4,9-dione, 5-hydroxy-2-(1-hydroxyethyl)naphtho[2,3-b]furan-4,9-dione, 2-iso-propenylnaphtho[2,3-b]furan-4,9-dione and 5-hydroxydehydroiso-α-lapachone isolated (*J. Nat. Prod.* 1993, *56*, 1500); two new naphthoquinones (IV and V) isolated and their structures elucidated as 3-hydroxymethylfuro[3,2-b]naphtho[2,3-d]furan-5,10-dione and 9-hydroxy-3-hydroxy-

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methylfuro[3,2-b]naphtho[2,3-d]furan-5,10-dione respectively (*Tetrahedron* 1993, *49*, 6757).

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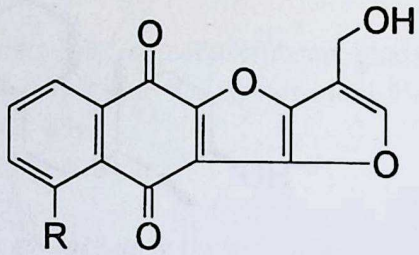

I
R = OMe, R' = OH
II
R = OMe, R' = H
III
R,R' = H

IV
R = H
V
R = OH

BIOLOGICAL ACTIVITY

Furanonaphthoquinones I, II, III, IV and 2-(1-hydroxyethyl)naphtho[2,3-b]furan-4,9-dione, 5-hydroxy-2-(1-hydroxyethyl)naphtho[2,3-b]furan-4,9-dione, 2-isopropenylnaphtho- [2,3-b]furan-4,9-dione and 5-hydroxydehydroiso-α-lapachone exhibited selective DNA-damaging activity (*Tetrahedron* 1993, *49*, 6757; *J. Nat. Prod.* 1993, *56*, 1500).

CRESSA (Convolvulaceae)

C. cretica L. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 217).

β-Sitosterol, its glucoside, n-octacosanol, umbelliferone, scopoletin, isopimpinellin and quercetin isolated (*J. Indian Chem. Soc.* 1990, *67*, 785).

CRINUM (Amaryllidaceae)

C. asiaticum L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 228).

Synthesis of ungeremine (*Tetrahedron Lett.* 1990, *31*, 1523).

C. latifolium L. syn. *C. zeylanicum* L. (*Compend. Indian Med. Plants*, Vol. 4; Rastogi & Mehrotra, PID, New Delhi, 1995, p. 229).

Two new epimeric pyrrolophenanthridine alkaloids - 2-epilycorine and 2-epipancrassidine - isolated from flower and stem and characterised; former compound also synthesised (*Phytochemistry* 1989, *28*, 2535).

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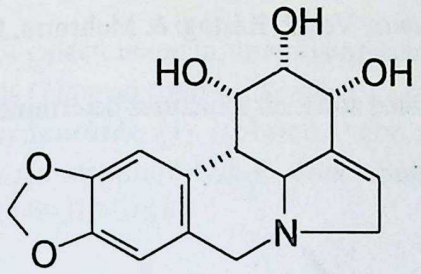
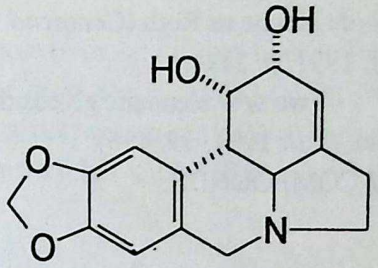


2-Epipancrassidine



2-Epilycorine

C. zeylanicum L.; see *C. latifolium* L.

CROCUS (Iridaceae)

C. sativus L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 207).

Effect of plant extract on macromolecular synthesis was examined in three human cell lines - A 549 (derived from a lung tumor), W1-38 (normal lung fibroblasts) and VA-13 (W1-38 cells transformed *in vivo* by SV 40 tumor virus). Malignant cells were more sensitive than normal cells to inhibitory effect of extract on both DNA and RNA synthesis but protein synthesis was not affected in both types of cells (*Bio Factors* 1992, *4,* 43; *Chem. Abstr.* 1993, *118,* 93927 a).

Astragalin, helichrysoside, kaempferol, kaempferol-3-O-β-D-glucosyl(1→2)-β-D-(6-acetyl)glucopyranoside and kaempferol-3-O-β-D-glucosyl(1→2)-β-D-glucopyranoside isolated from petals (*Zhongcaoyao* 1990, *21,* 439; *Chem. Abstr.* 1991, *114,* 214242 b); two new glycosides - crosatosides A and B - isolated from pollen along with kaempferol-3-O-β-D-glucosyl(1→2)-β-D-glucoside and characterised (*Xuexue Xuebao* 1991, *49,* 927: *Chem. Abstr.* 1992, *116,* 148197 d).

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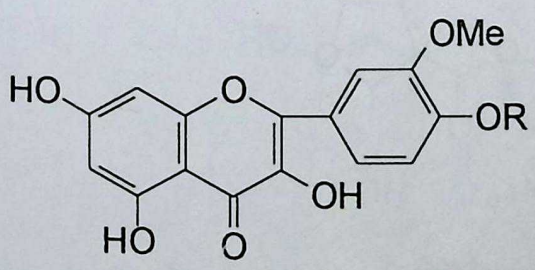
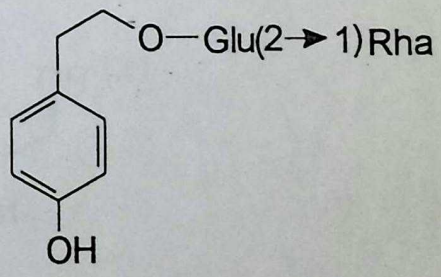


Crosatoside A
R = Glu(2→1)Rha



Crosatoside B

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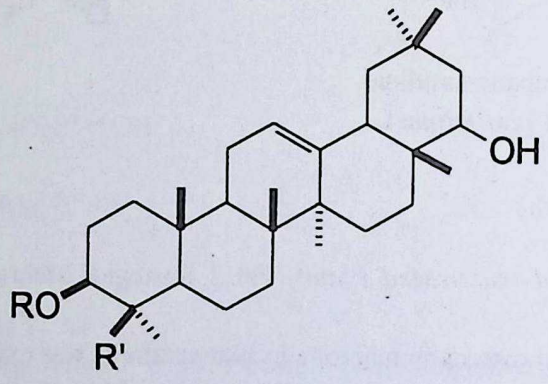
CROTALARIA (Papilionaceae)

C. albida Heyne ex Roth (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 218).

Two new oleanene glycosides (I and II) isolated and their structures determined (*Chem. Pharm. Bull.* 1991, *39*, 496).

NEW COMPOUNDS



I

R = Gluc.acid(6-Me)(2→1)Gal(2→1)Xyl, R' = Me

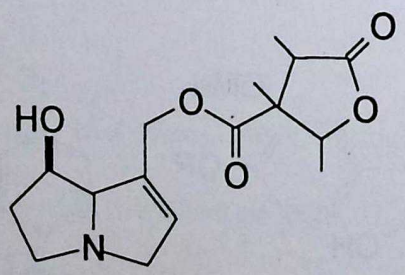
II

R = Gluc.acid(6-Me)(2→1)Gal[(2→1)Rha](6→1)Glu, R' = CH_2OH

C. assamica Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 231).

A new pyrrolizidine alkaloid - assamicadine - isolated and its structure determined (*J. Nat. Prod.* 1989, *52*, 1153).

NEW COMPOUNDS



Assamicadine

C. incana L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 231).

Stereoselective synthesis of (–)integerrimine (*J. Org. Chem.* 1992, *57*, 2270).

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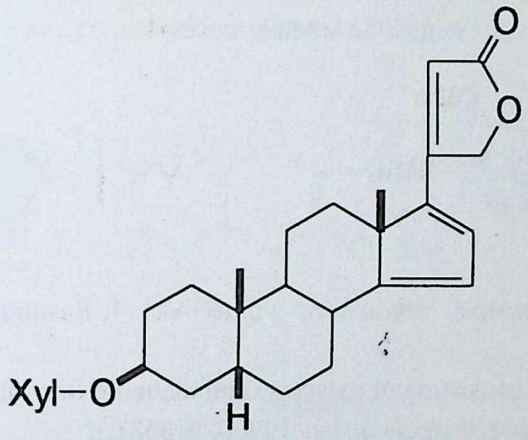
C. juncea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 231).

A galactomannan, comprising galactose and mannose in molar ratio of 1.0:2.3, isolated from seeds (*Tianran Chanwu Yanjiu Yu Kaifa* 1991, *3,* 31; *Chem. Abstr.* 1992, *116,* 55574 j); a novel cardenolide (I) isolated from seeds and its structure established as 14,16-dianhydrogitoxigenin-3-O-β-D-xylopyranoside (*Phytochemistry* 1994, *35,* 1375).

NEW COMPOUNDS



I

C. laburnifolia L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 221).

Essential amino acids identified in plant (*Acta Cienc. Indica, Chem.* 1992, *18,* 39; *Chem. Abstr.* 1994, *121,* 31126 s); isolation and characterisation of a new flavone glycoside (I) from seeds (*J. Indian Chem. Soc.* 1993, *70,* 273); aromadendrin-7-O-α-L-rhamnopyranosyl(1→4)-O-β-D-galactopyranoside (0.048%) determined in seeds (*Fitoterapia* 1993, *64,* 276).

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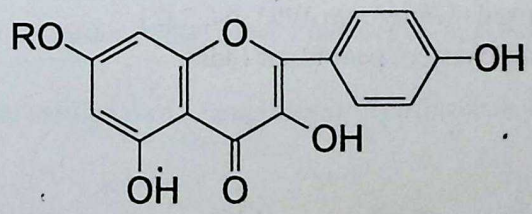

I

R = Gal(4→1)Rha

C. madurensis Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 232).

Crystal and molecular structures of madurensins A, B and C determined by X-rays analysis (*J. Nat. Prod.* 1991, *54,* 104).

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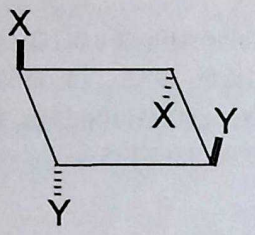
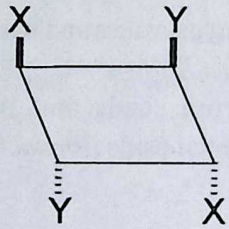
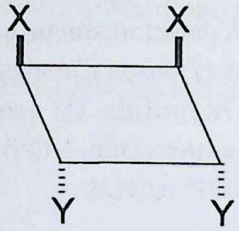


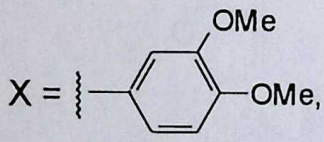
Madurensin A

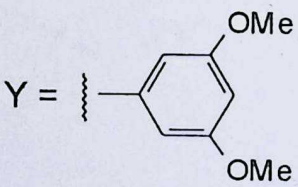


Madurensin B



Madurensin C





C. medicaginea Lam. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 232).

A polysaccharide, consisting of galactose and mannose in molar ratio of 10:31, isolated from seeds and characterised (*Phytochemistry* 1990, *29,* 853).

C. prostrata Rottl. ex Willd. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 81).

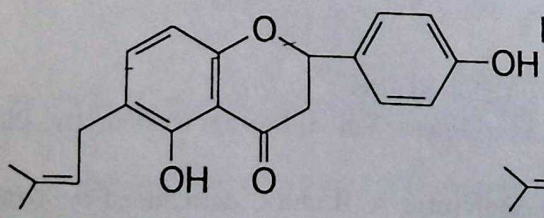
A new glycoside isolated and characterised as 5,6,3',4'-tetrahydroxy-3-gentiobiosylflavanone (*J. Indian Chem. Soc.* 1991, *68,* 632).

C. ramosissima Roxb.

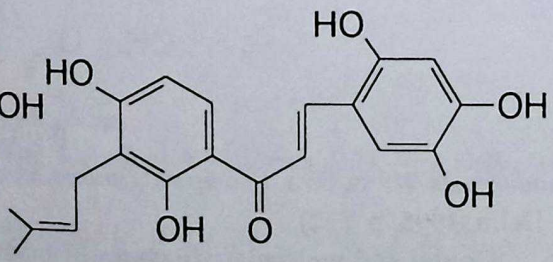
A new monoprenylated flavanone - crotaramosmin - isolated and its structure determined (*J. Nat. Prod.* 1992, *55,* 229); a new prenylated chalcone - ramosismin - isolated from fresh inflorescence and characterised (*Fitoterapia* 1993, *64,* 232).

Distribution: West Bengal and western peninsular India.

NEW COMPOUNDS



Crotaramosmin



Ramosismin

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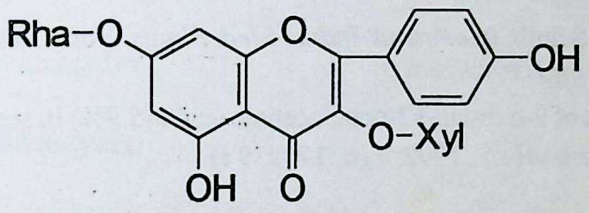
C. retusa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 233).

Pharmacognostic studies of leaves (*Biovigyanam* 1991, *17,* 77; *Chem. Abstr.* 1992, *117,* 137502 u).

C. semperflorens Vent. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 130).

A new flavonol diglycoside - lepidoside - isolated and characterised; in addition, kaempferol, kaempferitrin and crosemperine isolated (*J. Indian Chem. Soc.* 1991, *68,* 476).

NEW COMPOUNDS



Lepidoside

C. sessiliflora L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 233).

Isolation of monocrotaline, integerrimine and trichodesmine from seeds (*Planta Med.* 1992, *58,* 283).

BIOLOGICAL ACTIVITY

Monocrotaline irreversibly inhibited DNA synthesis in human embryo kidney cell cultures; it also inhibited synthesis of carbohydrates. Formation of lactate was decreased and intracellular pH was increased markedly (*Zhongguo Zhongyao Zazhi* 1990, *15,* 364; *Chem. Abstr.* 1990, *113,* 165075 t).

C. trifoliastrum Willd. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 233).

Asymmetric total synthesis of (–)supinidine (*Tetrahedron* 1990, *46,* 6361; *ibid.* 1991, *47,* 7635).

C. verrucosa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 233).

Taraxerol, β-sitosterol and linoleic, palmitic, stearic, lauric, oleic, linolenic, arachidic, myristic and ricinoleic acids isolated from fixed oil of stem (*Asian J. Chem.* 1993, *5,* 237; *Chem. Abstr.* 1993, *118,* 98055 z).

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CRYPTOCARYA (Lauraceae)

C. bourdillonii Gamble syn. *C. wightiana* sensu Hook.f., p.p. (non Thw.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 235).

A polysaccharide gum composed of arabinose and xylose in molar ratio of 6:1, isolated from bark and partially characterised (*Starch/Staerke* 1993, *45,* 358; *Chem. Abstr.* 1994, *120,* 7206 b).

C. wightiana Hook.f.; see *C. bourdillonii* Gamble

CRYPTOLEPIS (Asclepiadaceae)

C. buchanani Roem. & Schult. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 236).

Determination of 9-oxo-cis-12-octadecenoic acid (45.9%) in seed oil (*J. Am. Oil Chem. Soc.* 1992, *69,* 188; *Chem. Abstr.* 1992, *116,* 170239 r).

CRYPTOMERIA (Taxodiaceae)

C. japonica (L.f.) D.Don (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 237).

Sugiol, xanthoperol, ferruginol, phyllocladanol, sandaracopimarinol and β-sitosterol isolated (*Kogakubu Kenkyu Hokoku (Miyazaki Daigaku)* 1989, *35,* 157; *Chem. Abstr.* 1990, *113,* 37719 u); monoterpene hydrocarbons (45.0), monoterpene alcohols (10.0), monoterpene esters (2.0), sesquiterpenes (25.0) and diterpenes (12.0%) determined by GC-MS in essential oil; diterpenes consist of α-kaurene (10.0) and 16α-hydroxy-α-kaurene (0.6%) (*J. Essent. Oil Res.* 1990, *2,* 211; *Chem. Abstr.* 1990, *113,* 227975 x; *J. Essent. Oil Res.* 1991, *3,* 197; *Chem. Abstr.* 1992, *116,* 80417 t); vanillin, coniferyl aldehyde, ferruginol, sandaracopimaric acid, sandaracopimarinal, sandaracopimarinol and β-sitosterol isolated from heartwood and sapwood (*Kogakubu Kenkyu Hokoku* (*Miyazaki Daigaku*) 1991, *37,* 33; *Chem. Abstr.* 1992, *116,* 80493 q); five new hexacarbocyclic triterpenes - chamaecydin, 6α- and 6β-hydroxychamaecydins, 10'α- and 10'β-hydroxycryptoquinones - isolated from leaves and characterised (*Phytochemistry* 1993, *34,* 779); 4β-hydroxygermacra-1(10),5-diene, thujopsan-2α-ol and hedycaryol isolated from hexane extract of leaves whereas steam distillation of leaves afforded α-cadinol (an isomer of 4β-hydroxygermacra-1(10),5-diene), elemol and eudesmol (the isomers of hedycaryol) (*Phytochemistry* 1993, *33,* 879); four new abietane derivatives - compounds I, II, III and 6β-hydroxyferruginol - and two new kaurane derivatives (IV and V) isolated from leaves and characterised (*Phytochemistry* 1994, *35,* 1279).

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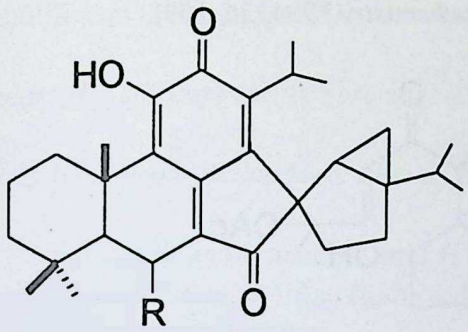
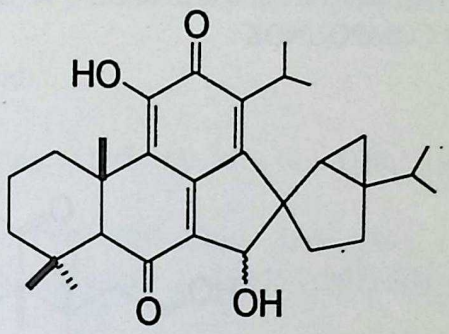
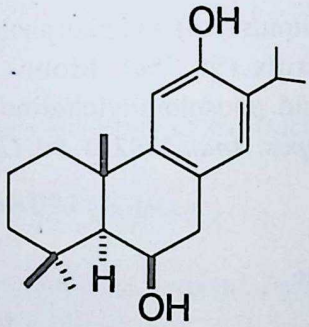


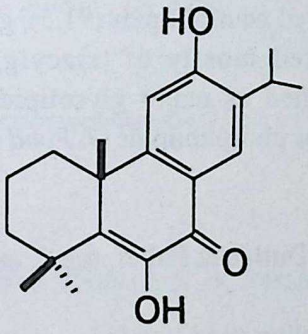
Chamaecydin
R = H
6α-Hydroxychamaecydin
R = α-OH
6β-Hydroxychamaecydin
R = β-OH



10'β-Hydroxycryptoquinone
~~ = β
10'α-Hydroxycryptoquinone
~~ = α



6β-Hydroxyferruginol



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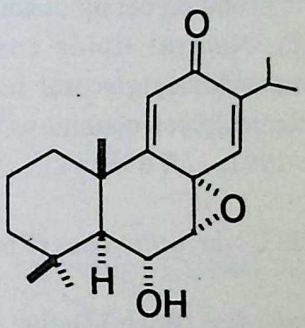

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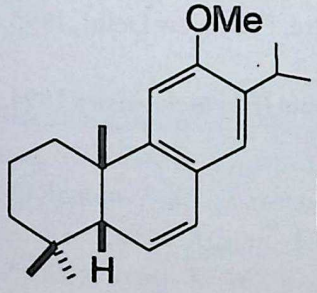

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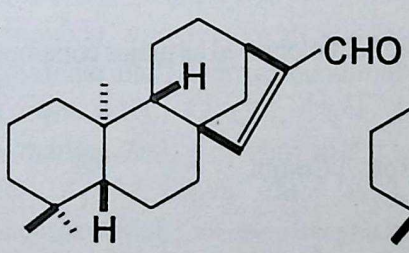

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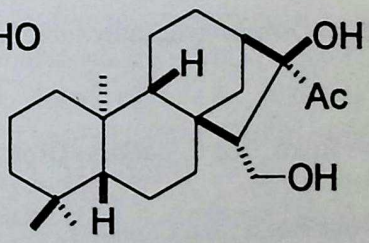

V

CUCUMIS (Cucurbitaceae)

C. callosus (Rottl.) Congn. syn. *C. trigonus* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 237).

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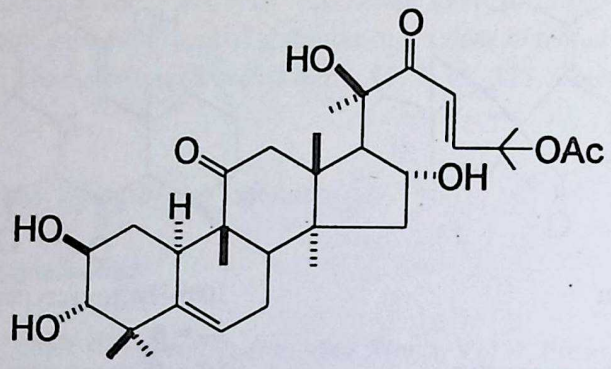
Cucurbitacins B, D and Q, chondrillasterol, 3-O-glucosides of stigmasterol, campesterol and β-sitosterol isolated from fruits (*Acta Pharm. Jugosl.* 1989, *39*, 137; *Chem. Abstr.* 1990, *112*, 52239 k); structure of cucurbitacin Q revised (*Phytochemistry* 1994, *36*, 159).

NEW COMPOUNDS



Cucurbitacin Q

C. melo L. syn. *C. melo* L. var. *utilissimus* (Roxb.) Duthie & Fuller (*utilissima*), *C. utilissimus* Roxb., *C. momordica* (Roxb.) Duthie & Fuller (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 237).

Total kernel lipids contained neutral lipids (91.5), glycolipids (6.4) and phospholipids (2.1%). Neutral lipids consisted mostly of triacylglycerols (90.7%). Mono- and digalactosyldiacylglycerol identified as major glycolipids, and phosphatidylcholine and phosphatidylglycerolamine as major phospholipids (*J. Food Compos. Anal.* 1992, *5*, 90; *Chem. Abstr.* 1992, *117*, 6569 y).

C. melo L. var. *utilissimus* (Roxb.) Duthie & Fuller; see *C. melo* L.

C. momordica (Roxb.) Duthie & Fuller; see *C. melo* L.

C. sativus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 238).

8,16-Dihydroxyhexadecanoic acid identified as major component (*Phytochemistry* 1994, *35*, 818).

C. trigonus Roxb.; see *C. callosus* (Rottl.) Congn.

C. utilissimus Roxb.; see *C. melo* L.

CUCURBITA (Cucurbitaceae)

C. ficifolia Bouche (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 216).

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Isolation of lectins from 6-days old seedlings and their characterisation by double immunodiffusion method (*Acta Biochim. Pol.* 1993, *40,* 103; *Chem. Abstr.* 1994, *120,* 461 b).

C. lagenaria L.; see *Lagenaria siceraria* (Molina) Standl.

C. pepo L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 238).

Total synthesis of cucurbic acid (*Chem. Lett.* 1990, 1797; *Chem. Abstr.* 1991, *114,* 43193e); extraction of cucurbitine from seeds and its synthesis (Fr. 2,673,375 (1992) Sep. 04; *Chem. Abstr.* 1993, *118,* 32935 e).

BIOLOGICAL ACTIVITY

Cucurbitine inhibited histidine decarboxylase *in vitro* and it may be used to reduce allergenic effects of cosmetics (Fr. 2,673,375 (1992) Sep. 04; *Chem. Abstr.* 1993, *118,* 32935 e).

CUDRANIA (Urticaceae)

C. cochinchinensis (Lour.) Kudo & Masam. ex Sauer.; see *Maclura cochinchinensis* (Lour.) Corner

C. javanensis Hook.f.; see *Maclura cochinchinensis* (Lour.) Corner

CUMINUM (Apiaceae)

C. cyminum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 239).

Seeds significantly decreased incidence of both benzo[a]pyrene-induced neoplasia in Swiss mice and 3'-methyl-4-dimethylaminoazobenzene-induced hepatomas in Wistar rats (*Food Chem. Toxicol.* 1992, *30,* 953; *Chem. Abstr.* 1993, *118,* 100782 e).

α-, β-Pinenes, camphene, myrcene, γ-terpinene, p-cymene, terpinolene, linalool, pulegone, cuminaldehyde, myrtenal and 2,3-dihydrocuminal identified in volatile oil of Chinese plant by GC-MS (*Zhiwu Xuebao* 1990, *32,* 372; *Chem. Abstr.* 1991, *114,* 98207 t); 1,4-p-menthadien-7-al, 1,3-p-menthadien-7-al, p-cymene and γ-terpinene identified in essential oil (*Essenze Deriv. Agrum.* 1991, *61,* 32; *Chem. Abstr.* 1993, *119,* 79787 u); determination of cuminaldehyde (37.18), p-menthadienal (26.24), γ-terpinene (12.17), β-pinene (11.49) and p-cymene (8.70%) in seed essential oil (*Zhongguo Tiaoweipin* 1993, 11; *Chem. Abstr.* 1993, *119,* 70917 d).

CUNNINGHAMIA (Pinaceae)

C. lanceolata Hook.f.; see *C. sinensis* R.Br.

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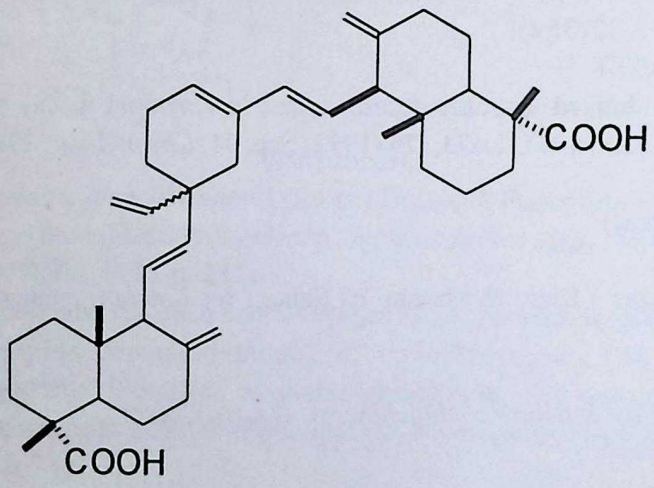
C. sinensis R.Br. syn. *C. lanceolata* Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 239).

Two stereoisomeric bis(labdane)-type stereoisomeric diterpenoids cunninghamic acids A and B - isolated as their methyl esters from cones and their structures established (*Tetrahedron Lett.* 1992, *33,* 5761); cedrol (60.5%) as major component along with α-cedrene, terpinyl acetate and terpinolene determined in wood essential oil by GC and GC-MS whereas leaf essential oil contained α-limonene (27.3%) and α- and β-pinenes (*J. Fac. Agric., Kyushu Univ.* 1992, *36,* 301; *Chem. Abstr.* 1992, *117,* 188227 r).

NEW COMPOUNDS



Cunninghamic acids A,B (stereoisomers)

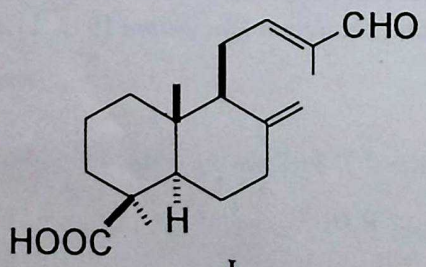
CUPRESSUS (Cupressaceae)

C. cashmeriana Royle ex Carriere; see *C. corneyana* Hort. ex Carriere

C. corneyana Hort. ex Carriere syn. *C. funebris* auct.(non Endl.), *C. cashmeriana* Royle ex Carriere (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 240).

A new norlabdane-type diterpene (I) isolated from leaves as methyl ester and its structure elucidated; in addition, four chlorophyll-derived pigments - pheophytin a, 10(S)- and 10(R)-hydroxypheophytins a and methyl pheophorbide a isolated (*Chem. Pharm. Bull.* 1991, *39,* 3348).

NEW COMPOUNDS



I

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C. funebris Endl.; see *C. corneyana* Hort. ex Carriere

C. lusitanica Mill.

Eng. - Mexican cypress, Goa cypress.

Leaves and twigs essential oil contained monoterpene hydrocarbons (65.0%); α-pinene (18.0%) identified as major constituent (*Flavour Fragrance J.* 1989, *4,* 185; *Chem. Abstr.* 1990, *112,* 164707 t).

Distribution: Western Ghats.

C. sempervirens L. syn. *C. sempervirens* L. var. *horizontalis* (Mill.) Gordon (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 240).

Essential oil of cones from Greece contained α-pinene (39.54) and γ-terpinene (11.56%) (*J. Essent. Oil Res.* 1991, *3,* 363; *Chem. Abstr.* 1992, *116,* 27780 e); twigs oil (0.4) and berries oil (0.16%) contained α-thujene, (+)sabinene, α- and β-pinenes, (+)camphene, cedrol and cedrenol (*Mansoura J. Pharm. Sci.* 1992, *8,* 37; *Chem. Abstr.* 1992, *117,* 257942 j); α-pinene (49.88), δ-car-3-ene (20.24), α-terpinyl acetate (5.28), myrcene (3.29), cedrol (2.97) and limonene (2.79%) determined in essential oil of Algerian plant (*J. Essent. Oil Res.* 1993, *5,* 671; *Chem. Abstr.* 1994, *121,* 153281 j); neocupressic acids I, II & III isolated previously from fruits now identified as communic, cupressic and sandaracopimaric acids, respectively (*Plant. Med. Phytother.* 1993, *26,* 5; *Chem. Abstr.* 1994, *120,* 187191 z).

C. sempervirens L. var. *horizontalis* (Mill.) Gordon; see *C. sempervirens* L.

CURCULIGO (Amaryllidaceae)

C. capitulata (Lour.) O.Kuntze syn. *C. recurvata* Dryand

Curculigine, isocurculigine and their 1-O-methyl ethers isolated from rhizomes in addition to nyasicoside (*Phytochemistry* 1994, *35,* 1343).

Distribution: Himalayas, from Nepal eastwards and Bengal, alt. 300-1000 m.

C. orchioides Gaertn. syn. *Hypoxis orchioides* Kurz (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 240).

Isolation of a new triterpene alcohol - curculigol - from rhizomes and its characterisation (*Phytochemistry* 1990, *29,* 929); structure of a new aliphatic compound from rhizomes established as 25-hydroxy-33-methylpentatriacontan-6-one (*Indian J. Chem.* 1990, *29*B, 493); a novel pentacyclic triterpene isolated from rhizomes and characterised as 31-methyl-3-oxo-20-ursen-28-oic acid (*Indian J. Chem.* 1991, *30*B, 986); six new triterpenoid saponins - curculigo saponins A, B, C, D, E and F - bearing a common genin - curculigenin A - isolated from rhizomes and their structures elucidated (*Chinese Chem. Lett.* 1991, *2,* 227; *Chem. Abstr.* 1991, *115,* 203301 q; *Phytochemistry* 1992, *31,* 233); rhizomes afforded four more new saponins - curculigo saponins

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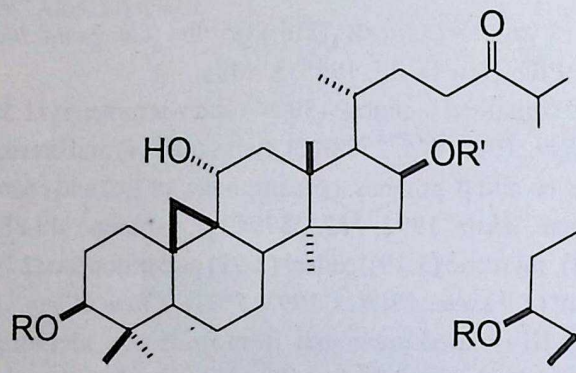
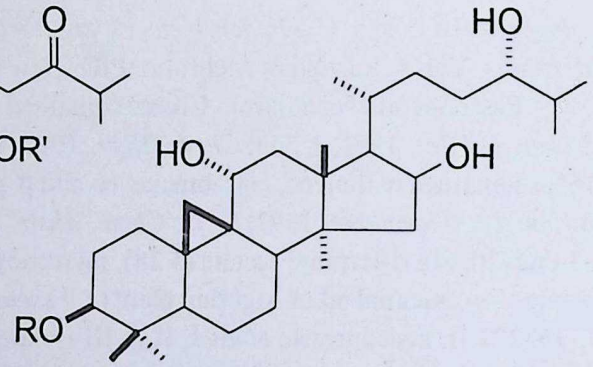
G, H, I and J - whose structures established (*Planta Med.* 1992, *58,* 208); three more saponins - curculigo saponins K, L and M - from rhizomes; in addition, new sapogenins - curculigenins B and C - isolated and characterised (*Phytochemistry,* 1992, *31,* 2455); isolation of three new phenylglycosides - curculigoside B, curculigines B and C - from rhizomes and their characterisation as 2β-D-glucopyranosyloxy-5-hydroxybenzyl-2'-methoxy-6'-hydroxybenzoate, 2,4-dichloro-3-methyl-5-methoxyphenol-O-β-D-apiofuranosyl(1→6)-β-D-glucoside and 2,4,6-trichloro-3-methyl-5-methoxyphenol-O-β-D-xylopyranosyl(1→6)-β-D-glucopyranoside respectively (*Yaoxue Xuebao* 1992, *27,* 353; *Chem. Abstr.* 1992, *117,* 147178 g).

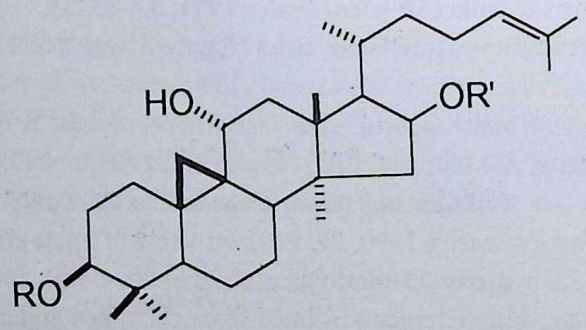
NEW COMPOUNDS



Curculigenin A
R,R' = H
Curculigo saponin A
R = Glu, R' = H
Curculigo saponin B
R = H, R' = Ara
Curculigo saponin C
R = Glu, R' = Ara
Curculigo saponin D
R = Glu(2→1)Glu, R' = H
Curculigo saponin E
R = Glu(2→1)Glu, R' = Ara
Curculigo saponin F
R = Glu(2→1)Glu(3→1)Glu, R' = H
Curculigo saponin G
R = Glu(2→1)Rha, R' = H
Curculigo saponin H
R = Glu(2→1)Rha, R' = Ara
Curculigo saponin I
R = Glu(2→1)Rha(3→1)Glu, R' = H
Curculigo saponin J
R = Glu(2→1)Rha(3→1)Glu, R' = Ara



Curculigenin B
R = H
Curculigo saponin K
R = Glu(2→1)Glu(3→1)Glu
Curculigo saponin L
R = Glu(2→1)Rha



Curculigenin C
R,R' = H
Curculigo saponin M
R = Glu(2→1)Glu(3→1)Glu, R' = Ara

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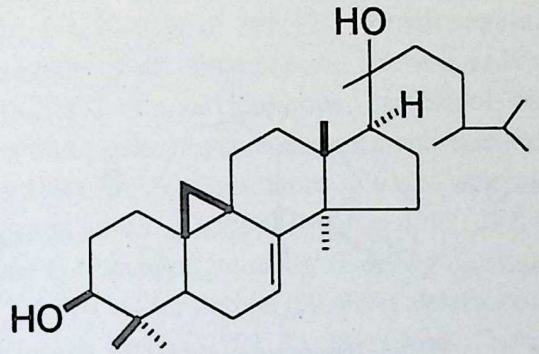

Curculigol

BIOLOGICAL ACTIVITY

Curculigo saponin G increased weight of thymus *in vivo* in mice (*Planta Med.* 1992, *58*, 208).

C. recurvata Dryand; see *C. capitulata* (Lour.) O.Kuntze

CURCUMA (Zingiberaceae)

C. amada Roxb. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 233).

Significant decrease was observed in liver total lipids and serum triglycerides of adult female rats when fed 10.0% mango ginger or 10.0% curcumin along with normal diet or a sucrose-based hypertriglyceridaemic diet. Feeding of 0.3% curcumin-free lipid fraction from mango ginger (corresponding to 10.0% mango ginger) along with the two diets also decreased liver triglycerides in both cases, but total lipids and triglycerides of serum were decreased only in rats on hypertriglyceridaemic diet (*J. Food Sci. Technol.* 1992, *29*, 130; *Chem. Abstr.* 1992, *117*, 46915 q).

C. aromatica Salisb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 241).

Total synthesis of (–)curdione (*Acta Chim. Sin.* 1989, 86; *Chem. Abstr.* 1990, *112*, 98868 t); eleven new sesquiterpenes - epiprocurcumenol, isoprocurcumenol, neoprocurcumenol, 4(S)13-acetoxydehydrocurdione (I), 4(S)13-hydroxydehydrocurcumenol (II), (4S,5S)13-hydroxygermacrone-4,5-epoxide (III), (4S,5S)13-acetoxygermacrone-4,5-epoxide (IV), (4S,5S)12-acetoxygermacrone-4,5-epoxide (V), acetoxyneocurdione, curcumadione and isocurcumadione - isolated and their structures established; 13-hydroxygermacrone also isolated (*Chem. Pharm. Bull.* 1990, *38*, 55); determination of xanthorrhizol (25.7), β-curcumene (25.5) and ar-curcumene (18.6%) in rhizome essential oil by GC-MS (*Flavour Fragrance J.* 1992, 7, 19; *Chem. Abstr.* 1992, *117*, 14281 p).

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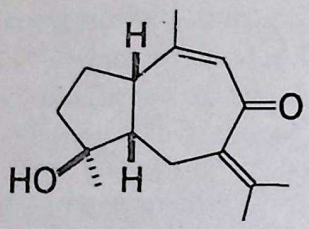
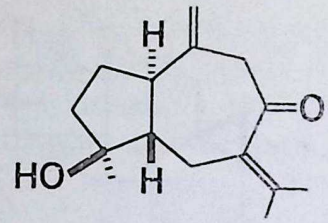
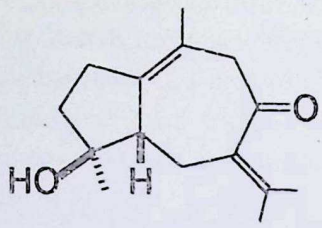


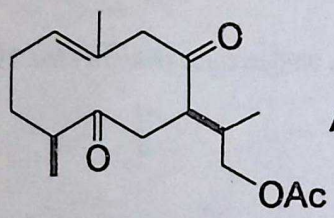
Epiprocurcumenol



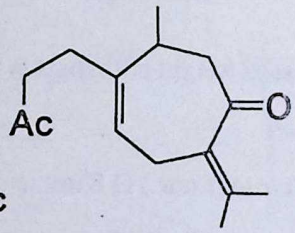
Isoprocurcumenol



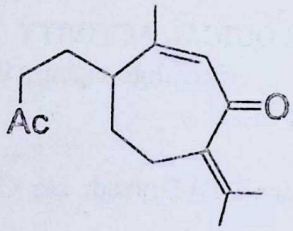
Neoprocurcumenol



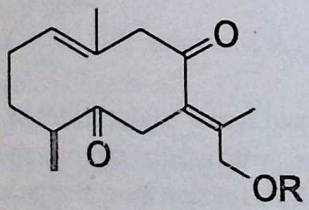
Acetoxyneocurdione



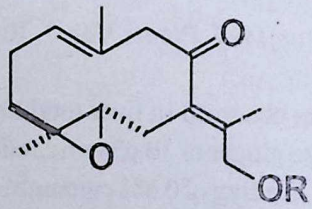
Curcumadione



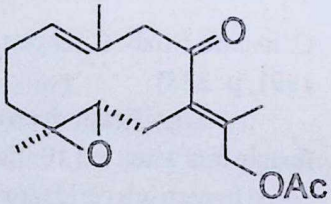
Isocurcumadione



I
R = Ac
II
R = H



III
R = H
IV
R = Ac



V

C. domestica (Medik.) Valeton; see *C. longa* L.

C. longa L. syn. *C. domestica* (Medik.) Valeton (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 242).

Out of seven cases of bronchial asthma under clinical trial treated with volatile oil (i.m.), response was good in 2 cases, fair in 2 cases but 3 cases did not show any response. Trial was discontinued due to side-effects like pain and kidney irritation (*J. Res. Ayurveda & Siddha* 1990, *21,* 20); rhizome extract inhibited desaturation of dihomo-γ-linolenic acid in arachidonic acid-producing fungus, *Mortierella alpina;* curcumin identified as active principle. It also inhibited 5-dehydro- and 6-dehydro-desaturases (*Lipids* 1992, *27,* 509).

Isolation of β-sesquiphellandrene from roots (*Saengyak Hakhoechie* 1989, *20,* 223; *Chem. Abstr.* 1990, *113,* 70809 w); determination of α-phellandrene (47.7) and terpinolene (28.9%) in leaf essential oil by GC-MS (*Flavour Fragrance J.* 1990, *5,* 89; *Chem. Abstr.* 1990, *113,*

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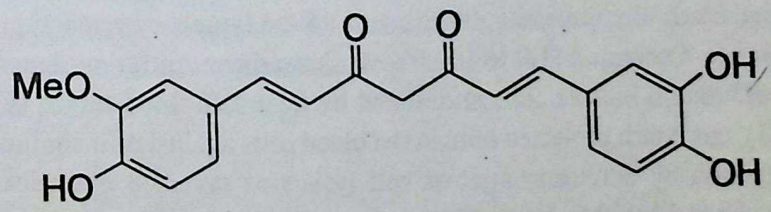
94813 u); five new sesquiterpenes - germacron-13-al, 4-hydroxybisabola-2,10-dien-9-one, 4-methoxy-5-hydroxybisabola-2,10-dien-9-one, 2,5-dihydroxybisabola-3,10-diene and procurcumadiol - isolated together with curcumenone, dehydrocurdione, (4S,5S)germacrone-4,5-epoxide, bisabola-3,10-dien-2-one, α-turmerone, bisacumol, bisacurone, curcumenol, isoprocurcumenol, zedoaronediol, procurcumenol, epiprocurcumenol and 4,5-dihydroxybisabola-2,10-diene (*Phytochemistry* 1990, *29*, 2201); isolation of a new water-soluble noncyclic peptide - turmerin - as antioxidant agent (*Arch. Biochem. Biophys.* 1992, *292*, 617; *Chem. Abstr.* 1992, *116*, 57749 u); ar-turmerone synthesised (*Huadong Huagong Xueyuan Xuebao* 1990, *16*, 61; *Chem. Abstr.* 1991, *114*, 62383 h); ar-turmerone (59.60%) determined as major constituent in essential oil (1.3%) by GC (*Indian Perfum.* 1991, *35*, 255; *Chem. Abstr.* 1992, *117*, 44617 v); ar-turmerone isolated (*Toxicon* 1992, *30*, 1211; *Chem. Abstr.* 1992, *117*, 225942 t); isolation of α- and β-turmerones from rhizomes (*J. Chem. Soc.* Perkin 1, 1992, 1519); turmerone (29.5), ar-turmerone (24.7), turmerol (20.0) and α-atlantone (2.4%) determined in rhizome essential oil by GC-MS (*Flavour Fragrance J.* 1992, *7*, 19; *Chem. Abstr.* 1992, *117*, 14281 p); a glycan - ukonan A - composed of arabinose, xylose, galactose, glucose, rhamnose and galacturonic acid in molar ratio of 12:4:12:1:4:10, isolated from rhizomes and partially characterised (*Phytochemistry* 1990, *29*, 1083; *Chem. Pharm. Bull.* 1990, *38*, 482); in addition, ukonan B and ukonan C isolated from rhizomes and found to be composed of arabinose, xylose, galactose, glucose, rhamnose and galacturonic acid in molar ratio of 12:4:12:1:2:4 and 8:3:6:14:2:3 respectively (*Chem. Pharm. Bull.* 1990, *38*, 482); rhizome also afforded ukonan D, composed of arabinose, galactose, glucose and mannose in molar ratio of 1:1:12:0.2, which was partially characterised (*Chem. Pharm. Bull.* 1992, *40*, 185); determination of curcumin, demethoxycurcumin and bisdemethoxycurcumin by HPLC (*Chromatographia* 1992, *34*, 73; *Chem. Abstr.* 1992, *117*, 169711 c); a stereoselective synthesis of (S)(+)γ-curcumene (*Chinese Chem. Lett.* 1992, *3*, 91; *Chem. Abstr.* 1992, *117*, 70064 g); (R) and (S) (+) α-curcumene also synthesised stereoselectively (*Youji Huaxue* 1993, *13*, 244; *Chem. Abstr.* 1994, *120*, 107356 u); two curcuminoid pigments (I and II) isolated from rhizomes and characterised as 1-(4-hydroxy-3-methoxyphenyl)-7-(3,4-dihydroxyphenyl)-1,6-heptadien-3,5-dione and 1,7-bis(4-hydroxyphenyl)-1,4,6-heptatrien-3-one respectively (*Phytochemistry* 1993, *33*, 501); isolation of two new phenolics (III and IV) from rhizomes and characterisation as 1,5-bis(4-hydroxy-3-methoxyphenyl)-penta-(1E,4E)-1,4-dien-3-one and 1-(4-hydroxy-3-methoxyphenyl)-5-(4-hydroxyphenyl)-penta-(1E,4E)-1,4-dien-3-one respectively; curcumin, demethoxycurcumin, bisdemethoxycurcumin and 5'-methoxycurcumin also isolated (*Phytochemistry* 1993, *32*, 1557).

NEW COMPOUNDS



I

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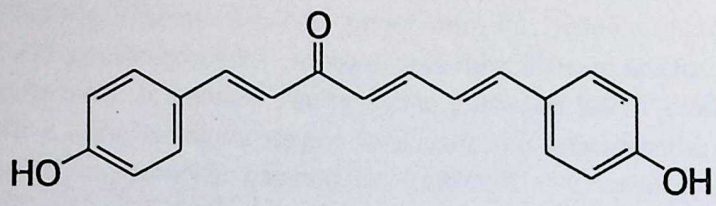
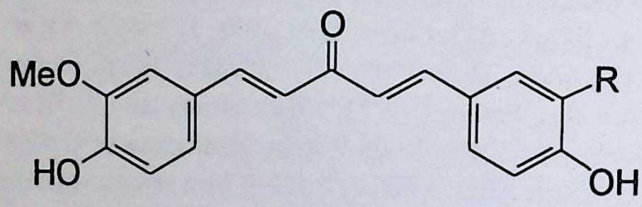
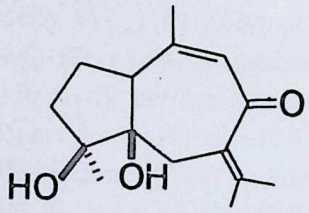


II



III
R = OMe
IV
R = H



Procurcumadiol

BIOLOGICAL ACTIVITY

Ukonans A, B, C and D showed marked reticuloendothelial system potentiating activity in carbon clearance test (*Chem. Pharm. Bull.* 1990, *38,* 482; *Phytochemistry* 1990, *29,* 1083); arturmerone neutralised haemorrhagic activity of *Bothrops jararaca* venom and lethal effect of *Crotalus durissus terrificus* venom in mice. It also inhibited proliferation and natural killer activity of human lymphocytes (*Toxicon* 1992, *30,* 1211; *Chem. Abstr.* 1992, *117,* 225942 t); β-sesquiphellandrene exhibited cytotoxicity against L1210 cells and the effect was potentiated 5-fold by (+)ar-turmerone (*Saengyak Hakhoechie* 1989, *20,* 223; *Chem. Abstr.* 1990, *113,* 70809 w).

Curcumin on topical application markedly inhibited TPA- and arachidonic acid-induced epidermal inflammation (ear oedema) in mice. Addition of 100.0 μM curcumin to cystosol from homogenate of mouse epidermis inhibited metabolism *in vitro* of arachidonic acid to 5-hydroxyeicosatetraenoic acid (5-HETE) by 83% and to 8-HETE by 85% (*Cancer Res.* 1991, *51,* 813; *Chem. Abstr.* 1991, *114,* 114763 d); in rat peritonea, curcumin exhibited concentration-dependent inhibition of calcium/calcium ionophore-stimulated formation of leukotriene B4, with EC50 of 2.7 μM (*Planta Med.* 1992, *58,* 226); in mononuclear cells, curcumin (1.0 - 3.0 μM) inhibited responses to phytohaemagglutinin and mixed lymphocyte reaction in concentration-dependent manner. Curcumin (1.0 to 100.0 μM) showed concentration-dependent inhibition of proliferation of smooth muscle cells stimulated by fetal calf blood serum (*Eur. J. Pharmacol.* 1992, *221,* 381); curcumin protected human red blood cells against primaquine-induced oxidative damage. Protection by curcumin against cell lysis was reversed upon increasing curcumin concentration above 20.0 μM. In contrast, curcumin added as liposome preparation remained

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protective even at higher concentration (*Int. J. Pharmacol.* 1994, *110,* 161); life span of cyclophosphamide-treated mice was increased by 40.8 and 91.7% by simultaneous administration of curcuma extract or curcumin respectively; leukoplenia produced by cyclophosphamide was also reduced by these agents (*Indian J. Pharm. Sci.* 1992, *54,* 213).

Turmerin is an efficient antioxidant and DNA-protectant. It contains three methionine residues which are partly responsible for antioxidant activity. Turmerin at 0.18 μM provided 80% protection to membranes and DNA against oxidative injury; tert.-Bu hydroperoxide was substantially inhibited by turmerin. Turmerin was not cytotoxic upto 1.0 mg concentration to human lymphocytes (*Arch. Biochem. Biophys.* 1992, *292,* 617; *Chem. Abstr.* 1992, *116,* 57749 u); curcumin, demethoxycurcumin, bisdemethoxycurcumin, 5'-methoxycurcumin and phenolics III and IV showed anti-inflammatory activity as determined by inhibition of oedema on mouse ear. Demethoxycurcumin, bisdemethoxycurcumin and 5'-methoxycurcumin showed stronger activity than curcumin, phenolic III showed comparable activity, while phenolic IV showed weaker activity (*Phytochemistry* 1993, *32,* 1557).

C. zedoaria (Berg.) Rosc. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 243).

Rhizome extract prolonged hexobarbital-induced sleep in mice (*Arch. Pharmacal. Res.* 1989, *12,* 196; *Chem. Abstr.* 1990, *112,* 30191 m).

Germacrone, germacrone epoxide and curzerenone isolated (*Arch. Pharmacal Res.* 1989, *12,* 196; *Chem. Abstr.* 1990, *112,* 30191 m); a new furan sesquiterpene (I) along with germacrone isolated and its structure determined (*Zhongguo Zhongyao Zazhi* 1991, *16,* 219; *Chem. Abstr.* 1991, *115,* 214618 z); curcumanolide A synthesised (*Chem. Lett.* 1992, 2343; *Chem. Abstr.* 1993, *118,* 124801 m).

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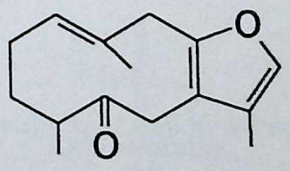

I

BIOLOGICAL ACTIVITY

Germacrone, its epoxide and curzerenone (0.1 to 0.2 mg/kg of each, i.p.) prolonged hexobarbital-induced sleep in mice and also inhibited aminopyrine N-demethylase activity. All compounds induced sleep at sub-hypnotic doses of hexobarbital implying that they possess central nervous system depressant properties (*Arch. Pharmacal Res.* 1989, *12,* 196; *Chem. Abstr.* 1990, *112,* 30191 m).

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CUSCUTA (Convolvulaceae)

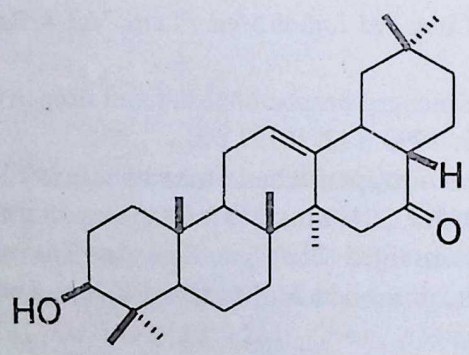
C. chinensis Lamk. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 85).

Isolation of quercetin, quercetin-3-O-β-galactosido-7-O-β-glucoside, astragalin and hyperin from seeds (*Zhongguo Zhongyao Zazhi* 1992, *17,* 292; *Chem. Abstr.* 1992, *117,* 128168 n); pentacosane, heptacosane, octacosane, nonacosane, triacontane, hentriacontane, triacontanol and β-sitosterol isolated (*Fitoterapia* 1994, *65,* 86).

C. reflexa Roxb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 221).

A triterpenoid - maragenin I - which is insect growth regulatory factor, isolated (*Natl. Acad. Sci. Lett.* 1990, *13,* 361); isolation of scoparone, melanettin, quercetin and hyperoside from plant parasitic on *Bougainvillea spectabilis* (*Fitoterapia* 1992, *63,* 381).

NEW COMPOUNDS



Maragenin I

CYAMOPSIS (Papilionaceae)

C. tetragonoloba (L.) Taub. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 244).

A new flavonol glycoside isolated and characterised as 3-O-(2-glucosylrhamnosido)-7-O-β-(2-rhamnosylglucosido)myricetin (*J. Indian Chem. Soc.* 1989, *66,* 833); isolation and structure elucidation of a new flavonol tetraglycoside as kaempferol-3-O-(2-dirhamnosylglucosido)-7-O-glucopyranoside from leaves (*J. Indian Chem. Soc.* 1992, *69,* 345); galactomannan determined in seeds by HPLC (*J. Sci. Food Agric.* 1992, *59,* 419; *Chem. Abstr.* 1992, *117,* 232384 r).

CYATHEA (Cyatheaceae)

C. gigantea (Wall. ex Hook.) Holtt. syn. *C. glabra* Bedd.

Diplopterol, hentriacontane, hopan-29-ol, oleanolic acid, β-sitostenone and sitosterol

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isolated (*Int. J. Crude Drug Res.* 1990, *28,* 161).
Distribution: Throughout hilly regions of India, alt. 1200 m.

C. glabra Bedd.; see *C. gigantea* (Wall. ex Hook.) Holtt.

CYATHOCLINE (Asteraceae)

C. lyrata Cass.; see *C. purpurea* (D.Don) Kuntze

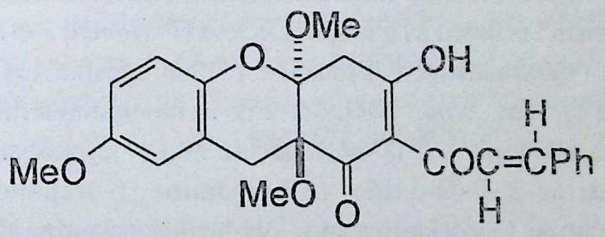
C. purpurea (D.Don) Kuntze syn. *C. lyrata* Cass. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 223).

Stereochemistry of 6α-hydroxy-4(14),10(15)-guaianadien-8α,12-olide established by high resolution NMR spectroscopy (*Spectrosc. Lett.* 1993, *26,* 997; *Chem. Abstr.* 1993, *119,* 250188 a).

CYATHOSTEMMA (Annonaceae)

C. viridiflorum Griff.

A cytotoxic compound - cyathoviridine - isolated from bark and its structure elucidated (*Nat. Prod. Lett.* 1993, *3,* 245; *Chem. Abstr.* 1994, *121,* 175173 c).
Distribution: Andaman Islands.
NEW COMPOUNDS



Cyathoviridine

BIOLOGICAL ACTIVITY

Cyathoviridine showed cytotoxicity against KB cells (IC50 4.5 μg/ml) (*Nat. Prod. Lett.* 1993, *3,* 245; *Chem. Abstr.* 1994, *121,* 175173 c).

CYCLAMEN (Primulaceae)

C. persicum Miller (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 246).

Cyclamenoside, a potent inhibitor of hydrogen peroxide release from peritoneal neutrophils of rats, isolated and its structure elucidated (*Chem. Lett.* 1992, 2375; *Chem. Abstr.* 1993, *118,* 143414 d).

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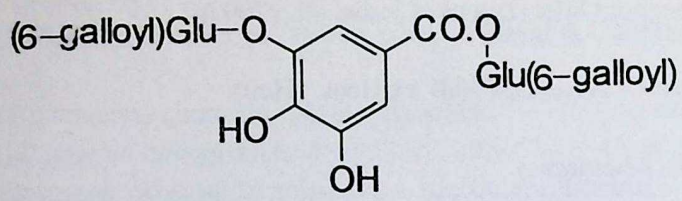

Cyclamenoside

CYCLEA (Menispermaceae)

C. barbata Miers; see *C. peltata* (Lamk.) Hook.f. & Thoms.

C. burmanni (DC.) Hook.f. & Thoms.; see *C. peltata* (Lamk.) Hook.f. & Thoms.

C. laxiflora Miers; see *C. peltata* (Lamk.) Hook.f. & Thoms.

C. peltata (Lamk.) Hook.f. & Thoms. syn. *C. barbata* Miers, *C. burmanni* (DC.) Hook.f. & Thoms., *C. laxiflora* Miers (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 246).

Alkaloid extract of roots showed cytotoxic and antimalarial activities (*J. Nat. Prod.* 1993, *56,* 22).

Phaeanthine and its (1S,1'S)-enantiomer (tetrandrine) isolated from roots (*Planta Med.* 1990, *56,* 245); dicentrine isolated as a major alkaloid (*Pertanika* 1991, *14,* 353; *Chem. Abstr.* 1993, *118,* 98071 b); (+)tetrandrine, (–)limacine, (+)thalrugosine, (+)homoaromoline and (–) cycleapeltine isolated (*J. Nat. Prod.* 1993, *56,* 22); isolation and structure elucidation of two bisbenzylisoquinoline alkaloids - (–)2'-norlimacine and (+)cycleabarbatine - from roots; in addition, (+)tetrandrine-2'-β-N-oxide, (+)berbamine, (–)repandine, (+)cycleanorine, (+)daphnandrine, (–)curine, (+)coclaurine and (–)N-methylcoclaurine also isolated (*J. Nat. Prod.* 1993, *56,* 1989).

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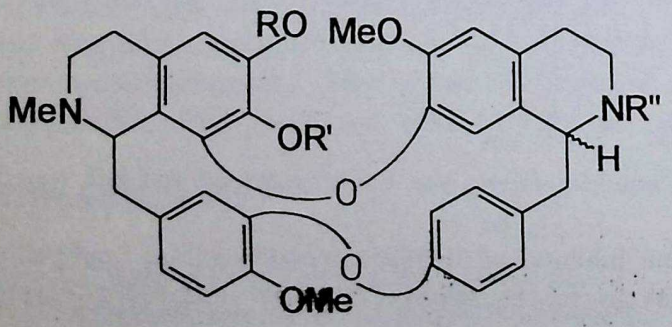

(+)Cyclea barbatine
R = H, R',R" = Me, ~~ = α
(-)2'-Norlimacine
R = Me, R',R" = H, ~~ = β

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BIOLOGICAL ACTIVITY

Tetrandrine suppressed delayed-type hypersensitivity in mice, effect being more pronounced when treatment was begun two days prior to immunisation with sheep erythrocytes. Similar dosage regimen delayed rejection of cardiac transplants. These immunomodulatory properties of tetrandrine may partly account for its potential in treatment of diseases where immunological mechanism play major role in pathogenesis (*Int. Arch. Allergy Appl. Immunol.* 1989, *90,* 169; *Chem. Abstr.* 1990, *112,* 16027 f); tetrandrine inhibited increase in cytoplasmic free Ca^{2+} induced by calcimycin, LTB4 and platelet-activating factor in rat neutrophils due to decrease of Ca^{2+} influx. Apparently tetrandrine acts as Ca^{2+} antagonist which may be related to its antiallergic actions (*Zhongguo Yaoli Xuebao* 1989, *10,* 533; *Chem. Abstr.* 1990, *112,* 111724 q); tetrandrine at 0.1 g/day was effective in treatment of malaria. Its IC50 value against chloroquine-resistant *Plasmodium falciparum* in human erythrocyte *in vitro* was 197.5 nM (US 505,020 (1991) Jun. 18; *Chem. Abstr.* 1991, *115,* 105992 w).

Tetrandrine (0.1 to 5.0 μg/ml) inhibited capacity of human mononuclear leucocytes to produce tumor necrosis factor alpha in culture when stimulated with killed *Staphylococcus aureus* (*Clin. Exp. Immunol.* 1990, *80,* 232; *Chem. Abstr.* 1990, *113,* 52235 b); tetrandrine mobilized Ca^{2+} from intracellular stores of HL-60 cells in concentration-dependent manner, with EC50 value 20.0 μM. Tetrandrine-induced intracellular Ca^{2+} release was independent of protein kinase C activity and α-adrenoceptor activation (*Brit. J. Pharmacol.* 1994, *113,* 767); tetrandrine, in addition to its well-known vasodilator effect via blockade of Ca^{2+} channels, produced a novel contractile effect on dog saphenous vein which was specifically associated with activation of postjunctional α_2-adrenoceptors functionally characteristic in venous smooth muscle (*Eur. J. Pharmacol.* 1993, *238,* 431); study of relaxant action of (1S,1'S)tetrandrine and isotetrandrine on rat aortic strips in presence and absence of extracellular calcium showed that contractile response elicited by depolarising solution (KCl 80 mM) or noradrenaline (1.0 μM), is concentration dependent. In Ca^{2+} -free solution both alkaloids inhibited contraction induced by noradrenaline (*Pharmazie* 1994, *49,* 440; *Chem. Abstr.* 1994, *121,* 99093 j).

CYDONIA (Rosaceae)

C. oblonga Mill. syn. *C. vulgaris* Pers. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 247).

4-Hydroxy-7,8-dihydro-β-ionone identified in fruit juice by GC-MS (*J. Agric. Food Chem.* 1990, *38,* 796; *Chem. Abstr.* 1990, *112,* 137791 j); an unusual (4-O-methyl-D-glucurono)-D-xylan isolated from seed mucilage and partially characterised (*Carbohydr. Res.* 1990, *207,* 307; *Chem. Abstr.* 1991, *114,* 39209 x); isolation of quince oxepine and isomeric quince oxepanes from fruits; structure of former elucidated as (E)2,3,6,7-tetrahydro-4-methyl-2-(3-methylbuta-1,3-dienyl)oxepine, whereas quince oxepane was 1:1 mixture of cis- and trans-(E)-4-methyl-2-(3-methylbuta-1,3-dienyl)oxepanes; their structures confirmed by synthesis (*Helv. Chim. Acta* 1991, *74,* 179); structure elucidation and synthesis of two new ionone-type compounds (I and II)

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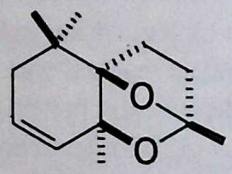
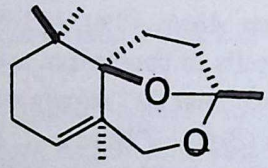
(*Tetrahedron Lett.* 1991, *32,* 753); β-D-gentiobioside and β-D-glucoside of 3(R)-hydroxy-β-ionone isolated from fruits and their structures determined (*J. Agric. Food Chem.* 1991, *39,* 2142; *Chem. Abstr.* 1991, *115,* 275759 t); isolation and structure determination of β-D-gentiobioside of 3-hydroxy-β-ionol from fruits (*Phytochemistry* 1991, *30,* 3021); (2E,4E)2,7-dimethoxyoctadien-1,8-diol, (2E,4E,7Z)2,7-dimethyldecatrien-1,10-diol and (4E,6E)2,7-dimethyl-8-hydroxyoctadienoic acid, three acyclic precursors of isomeric marmelo oxides, marmelo lactones and quince oxepine respectively, as well as three acyclic C10 compounds - 3(E)2,7-dimethylocten-1,8-diol, (2E,4E)2,7-dimethyl-8-hydroxyoctadienoic acid and (2E,4E)2,7-dimethyloctadiendioic acid - isolated from enzymatic hydrolysate of glycosidic fraction of fruits (*Tetrahedron Lett.* 1991, *32,* 4487); 2,7-dimethyl-8-hydroxy-(4E,6E)-octadien-1-yl-β-D-glucopyranoside (III) as precursor of isomeric marmelo oxides, isolated from fruits and characterised as its pentaacetate (*Tetrahedron Lett.* 1991, *32,* 5943); fruits afforded trans-abscisic alcohol-β-D-glucoside (*Phytochemistry* 1992, *32,* 57).

NEW COMPOUNDS



I



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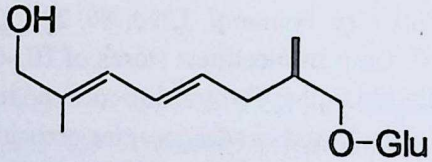

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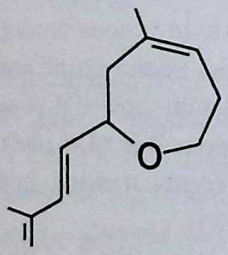
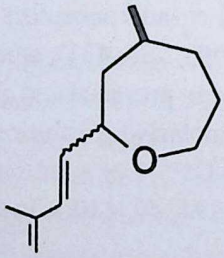


Quince oxepine



Cis-quince oxepane
~~ = β
Trans-quince oxepane
~~ = α

C. vulgaris Pers.; see *C. oblonga* Mill.

CYLISTA (Papilionaceae)

C. scariosa Roxb.; see *Paracalyx scariosus* (Roxb.) Ali

CYMBALARIA (Scrophulariaceae)

C. muralis Gaertn., Mey. & Schreb. syn. *Linaria cymbalaria* Mill. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 226).

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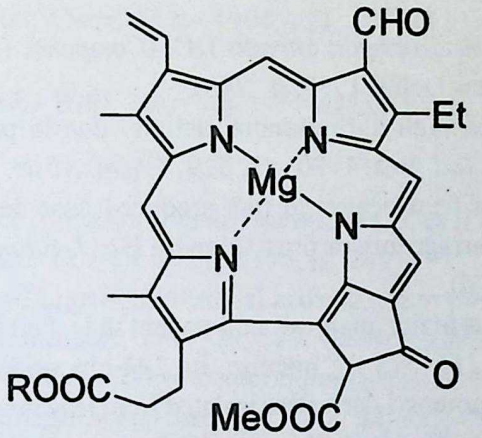
2-Monovinylprotochlorophyllide b and its phytyl ester detected and their structures established and confirmed by synthesis (*J. Biol. Chem.* 1991, *266*, 17151).

NEW COMPOUNDS



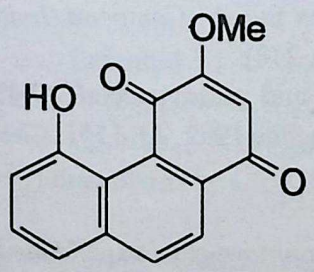
2-Monovinylprotochlorophyllide b
R = H
2-Monovinylprotochlorophyllide b phytyl ester
R = Phytyl

CYMBIDIUM (Orchidaceae)

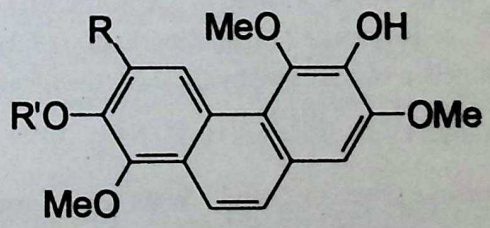
C. aloifolium (L.) Swartz syn. *C. pendulum* (Roxb.) Swartz (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 247).

A new phenanthraquinone - cymbinodin A - isolated and its structure established; friedelin and sitosterol also isolated (*Phytochemistry* 1990, *29*, 3046); pendulin isolated and its structure established; 3,7-dihydroxy-2,4,8-trimethoxyphenanthrene (I) also isolated (*Phytochemistry* 1991, *30*, 2432); isolation and characterisation of cymbinodin B as 3,6,7,8-tetramethoxy-1,4-phenanthraquinone (*Indian J. Chem.* 1992, *31*B, 557).

NEW COMPOUNDS



Cymbinodin



Pendulin
R = OMe, R' = Me
I
R, R' = H

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C. pendulum (Roxb.) Swartz; see *C. aloifolium* (L.) Swartz

CYMBOPOGON (Poaceae)

C. citratus (DC.) Stapf syn. *Andropogon citratus* DC. (*Compend. Indian Med. Plants* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 248).

Essential oil showed high antimicrobial activity due to presence of citral as major component (*Pakistan J. Sci. Ind.* Res. 1990, *33*, 529; *Chem. Abstr.* 1992, *116*, 27904 y); oral administration of infusion of fresh leaves to rats produced dose-dependent analgesia against hyperanalgesia induced by carrageenin or prostaglandin E2 (*J. Ethnopharmacol.* 1991, *34*, 43; *Chem. Abstr.* 1992, *116*, 574 d).

Myrcene identified as major analgesic component in leaf oil (*J. Ethnopharmacol.* 1991, *34*, 43; *Chem. Abstr.* 1992, *116*, 574 d); luteolin, its 7-O-glucoside and 7-O-neohesperoside, homoorientin and its 2"-O-rhamnosyl derivative isolated from leaves whereas chlorogenic, caffeic and p-coumaric acids, fructose, sucrose, octacosanol, triacontanol and dotriacontanol identified by HPLC (*Pharm. Acta Helv.* 1991, *66*, 242; *Chem. Abstr.* 1992, *116*, 80441 w); a process developed for extraction of citral from essential oil (*Philipp. J. Sci.* 1993, *122*, 269; *Chem. Abstr.* 1994, *121*, 212605 t).

BIOLOGICAL ACTIVITY

Myrcene showed significant inhibition of nociception in mice at doses of 10.0 and 20.0 mg/kg (i.p.) or 20.0 and 40.0 mg/kg (s.c.) (*J. Pharm. Pharmacol.* 1990, *42*, 877).

C. coloratus (Nees ex Hook.f.) Stapf syn. *Andropogon nardus* L. var. *coloratus* Nees ex Hook.f.

Tam. - Manjen pullu, Manakru pillu, Senga manu mala pillu, Sengana pillu.

Determination of geraniol (69.11), limonene (5.81), geranyl acetate (3.80), trans-β-ocimene (3.46), neral (2.27), elemol (2.04), myrcene (1.76), linalool (1.69) and geranial (1.39%) in essential oil by GC-MS (*Planta Med.* 1992, *58*, 479).

Distribution : Central to peninsular India.

C. distans (Nees ex Steud.) Wats. syn. *Andropogon distans* Nees ex Steud. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 248).

α-Terpinene (27.8), piperitone (18.2), intermediol (14.4) and geranyl acetate (7.3%) determined in essential oil by GC-MS (*Gaodeng Xuexiao Huaxue Xuebao* 1992, *13*, 1551; *Chem. Abstr.* 1993, *118*, 230199 f).

C. flexuosus (Nees ex Steud.) Wats. var. *flexuosus* syn. *Andropogon nardus* L. var. *flexuosus* (Nees ex Steud.) Hack., *Cymbopogon travancorensis* Bor (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 248).

Essential oil from freshly harvested foliage of 9 month old plant raised in Bangalore contained mono- and sesquiterpene hydrocarbons (39.60), oxygenated terpenes (30.45) and

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phenylpropanoids (22.04%); limonene (18.07), elemicin (17.22), camphene (11.86), elemol (11.21) and borneol (9.71%) determined by GC-MS (*Planta Med.* 1992, *58*, 219); determination of geraniol (30.5), citronellol (24.1), geranial (13.6) and neral (10.3%) in essential oil by GC-MS (*J. Essent. Oil Res.* 1994, *6*, 85; *Chem. Abstr.* 1994, *121*, 78293j); synthesis of β-bisabolene (*Huaxue Shijie* 1993, *34*, 308; *Chem. Abstr.* 1994, *121*, 205714 z).

C. flexuosus (Nees ex Steud.) Wats. var. *microstachys* (Hook.f.) Bor ; see *C. microstachys* (Hook.f.) Soenarko

C. jwarancusa (Jones) Schult. syn. *Andropogon jwarancusa* Jones (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 249).

Essential oil showed high antimicrobial activity due to presence of piperitone as major component (*Pakistan J. Sci. Ind. Res.* 1990, *33*, 529; *Chem. Abstr.* 1992, *116*, 27904y).

Crystal structure of cadinene dihydrochloride and (-)cadinene dihydrochloride determined by X-ray analysis (*J. Crystallogr. Spectrosc. Res.* 1992, *22*, 557; *Chem. Abstr.* 1993, *118*, 7211 h); piperitone (64.70%) determined in essential oil by GC-MS (*J. Essent. Oil. Res.* 1993, *5*, 639; *Chem. Abstr.* 1994, *121*, 42384a).

C. jwarancusa (Jones) Schult. ssp. *olivieri* (Boiss.) Soenarko syn. *Andropogon jwarancusa* Jones ssp. *loniger* sensu Hook.f. (non Desf.), *Cymbopogon olivieri* (Boiss.) Bor (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 228).

Geranial (25.47) and neral (17.98%) determined in essential oil (*J. Essent. Oil Res.* 1993, *5*, 639; *Chem. Abstr.* 1994, *121*, 42384 a).

C. khasianus (Hack.) Stapf ex Bor syn. *Andropogon khasianus* Munro ex Duthie (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 249).

Detection of methyl eugenol, methyl isoeugenol and β-bisabolene in essential oil (*Zhiwu Ziyuan Yu Huanjing* 1992, *1*, 58; *Chem. Abstr.* 1993, *118*, 3888 m).

C. martinii (Roxb.) Wats. syn. *Andropogon schoenanthus* L. var. *martinii* Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 249).

Essential oil showed high antimicrobial activity due to presence of geraniol as major component (*Pakistan J. Sci. Ind. Res.* 1990, *33*, 529; *Chem. Abstr.* 1992, *116*, 27904y).

Geraniol (79.19) geranyl acetate (9.15) and linalool (3.64%) determined in essential oil from Indian plants by GC-MS (*J. Essent. Oil Res.* 1990, *2*, 93; *Chem. Abstr.* 1990, *113*, 103190 t).

C. microstachys (Hook.f.) Soenarko syn. *Andropogon nardus* L. var. *microstachys* Hook.f., *Cymbopogon flexuosus* (Nees ex Steud.) Wats. var. *microstachys* (Hook.f.) Bor

Elemicin (25.3), methyl eugenol (19.5) and isoelemicin (11.0%) determined in essential oil by GC-MS (*J. Indian Chem. Soc.* 1990, *67*, 526).

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Distribution : Northern, eastern and north-eastern India.

C. olivieri (Boiss.) Bor; see *C. jwarancusa* (Jones) Schult. var. *olivieri* (Boiss.) Soenarko.

C. schoenanthus (L.) Spreng. syn. *Andropogon schoenanthus* L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 229).

γ-Elemene, γ-selinene, calamenene, cadalene, caryophyllene epoxide, piperitone, β-eudesmol, elemol, α-eudesmol, carrisone, cryptomeridiol, β-sitosterol and p-hydroxycinnamic acid identified in whole plant (*Pharmazie* 1990, *45*, 296; *Chem. Abstr.* 1990, *113*, 74916 b); caryophyllene and its oxide obtained in total yield of 0.8% from leaf oil (*Indian Drugs* 1990, *28*, 37); limonene (19.54) and 2-undecanone (14.68%) determined in essential oil by GC-MS (*J. Essent. Oil Res.* 1993, *5*, 639; *Chem. Abstr.* 1994, *121*, 42384a).

C. travancorensis Bor; see *C. flexuosus* (Nees ex Steud.) Wats. var. *flexuosus*

CYNANCHUM (Asclepiadaceae)

C. acutum L. syn. *C. heydei* Hook.f.

β-Sitosterol, α-amyrin, lupeol and its acetate and a complex series of lupeol fatty esters containing mainly behenic and palmitic moieties, isolated from aerial parts (*Egypt. J. Pharm. Sci.* 1990, *31*, 99; *Chem. Abstr.* 1990, *113*, 148861 d).
Distribution: Ladakh.

C. auriculatum Royle ex Wight (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 250).

Identification of gagamine, caudatin, metaplexigenin and kidjolanin in rhizomes (*Yunnan Zhiwu Yanjiu* 1989, *11*, 358; *Chem. Abstr.* 1990, *112*, 155191 t); three new steroid glycosides - cynauricuosides A, B and C - isolated from leaves and characterised as kidjoranin-3-O-β-D-glucosyl(1→4)-α-L-cymarosyl(1→4)-β-D-cymarosyl(1→4)-α-L-diginosyl(1→4)-β-D-cymaroside, metaplexigenin-3-O-α-L-cymarosyl(1→4)-β-D-cymarosyl(1→4)-α-L-diginosyl(1→4)-β-D-cymaroside and caudatin-3-O-β-D-glucosyl(1→4)-β-D-glucosyl(1→4)-α-L-cymarosyl(1→4)-β-D-cymarosyl(1→4)-α-L-diginosyl(1→4)-β-D-cymaroside respectively; wilfosides C1N, C3N, C1G and K1N also isolated (*Yunnan Zhiwu Yanjiu* 1990, *12*, 197; *Chem. Abstr.* 1991, *114*, 98149a); polysaccharides composed of arabinose, xylose, mannose, galactose, rhamnose and glucose isolated from roots (*Zhongguo Zhongyao Zazhi* 1991, *16*, 163; *Chem. Abstr.* 1991, *115*, 131926x).

C. heydei Hook.f.; see *C. acutum* L.

C. vincetoxicum Pers.; see *Vincetoxicum album* (Mill.) Aschers

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CYNARA (Asteraceae)

C. scolymus L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 251).

Apigenin, cynaroside, scolymoside, cosmoside, quercetin, rutin, scopoletin, hesperitin, hesperidoside, maritimein, luteolin, its 4'-O-β-glucoside and 7-O-gentiobioside, esculetin-6-O-β-glucoside, chlorogenic acid, caffeic acid and isochlorogenic acid isolated (*Ann. Pharm. Fr.* 1989, *47*, 95; *Chem. Abstr.* 1990, *112*, 115771a); linoleic (50.33), oleic (41.6), stearic (6.59) and palmitic (1.35%) acids determined in oil by GC-MS (*Res. Ind.* 1992, *37*, 29; *Chem. Abstr.* 1992, *117*, 46986 p); three new guaianolides - grosulfeimin (11-H, 13-methylsulphonylgrosheimin), 8-deoxy-11,13-dihydroxygrosheimin and 8-deoxy-11-hydroxy-13-chlorogrosheimin - isolated from leaves and their structures determined (*Nat. Prod. Lett.* 1993, *3*, 21; *Chem. Abstr.* 1994, *121*, 31082 z).

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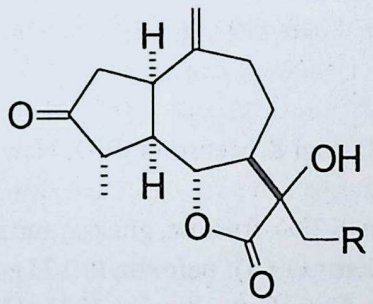
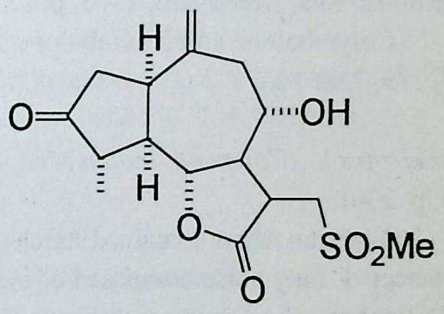


8-Deoxy-11,13-dihydroxygrosheimin
R = OH
8-Deoxy-11-hydroxy-13-chlorogrosheimin
R = Cl



Grosulfeimin

CYNODON (Poaceae)

C. dactylon (L.) Pers. (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 88).

Isolation of 2-(3'-methoxy-4'-hydroxyphenyl)propionic acid, 3-methoxy-4-hydroxybenzoic acid, 4-hydroxybenzoic acid, 2-(4'-hydroxyphenyl)propionic acid, phytol, sitosterol and stigmasterol acetate (*Pharmazie* 1991, *46*, 233; *Chem. Abstr.* 1991, *115*, 25999 p).

CYNOGLOSUM (Boraginaceae)

C. nervosum Benth. ex Clarke; see *C. petiolatum* (Hook.) DC. var. *nervosum* (Benth. ex Clarke) Bennet

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C. petiolatum (Hook.) DC. var. *nervosum* (Benth. ex Clarke) Bennet syn. *C. nervosum* Benth. ex Clarke

Three pyrrolizidine alkaloids, echinatin , (+)rinderine and (-)heliotrine, isolated along with their N-oxides (*Fitoterapia* 1991, *62*, 186).

Distribution: Himachal Pradesh, upto alt. 3600 m.

CYPERUS (Cyperaceae)

C. bulbosus Vahl

Caryophyllene oxide and humulene oxide isolated from tubers (*Kinki Daigaku Nogakubu Kiyo* 1994, *27*, 39; *Chem. Abstr.* 1994, *121*, 129922 y).

Distribution: Throughout India, in plains.

C. corymbosus Rottb. syn. *C. tegetiformis* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 252).

Corymbolone and corymbolol synthesised (*Quim. Nova* 1993, *16*, 105; *Chem. Abstr.* 1993, *119*, 72859 k).

C. esculentus L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 230).

Nigerian tubers contained starch (48.3) and protein (6.3%); fructose, glucose and sucrose also detected; fatty acids composed of oleic (75.72), linoleic (11.64), palmitic (10.21), stearic (1.47), linolenic (0.64) and arachidic (0.32%) acids (*Seifen, Oele, Fette, Wachse* 1991, *117*, 529; *Chem. Abstr.* 1992, *116*, 18404 h).

C. juncifolius Klein; see *C. stoloniferus* Retz.

C. longus L. (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 88).

Aerial and underground parts of plant contained 0.095 and 0.044% alkaloids respectively; brevicolline constituted 84.27, 60.58 and brevicarine 15.62 and 39.36% of total alkaloids in aerial and underground parts respectively (*Izv. Akad. Nauk Tadzh. SSR, Otd. Fiz-Mat., Khim. Goel. Nauk* 1990, 31; *Chem. Abstr.* 1993, *119*, 45220 p).

C. rotundus L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 252).

Tubers from Nigerian plant contained ~10.0% volatile oil and starch was most abundant constituent; glucose, sucrose, maltose and fructose detected in free sugar fraction; protein content was 4.9% (*Riv. Ital. Sostanze Grasse* 1989, *66*, 211; *Chem. Abstr.* 1992, *116*, 37917 u);

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caryophyllene identified in tuber essential oil by GC-MS (*Plant Growth Regul.* 1993, *13*, 89; *Chem. Abstr.* 1994, *120*, 27445 g).

C. rotundus L. ssp. *tuberosus* (Rottb.) Kuekenth. syn. *C. tuberosus* Rottb.

Rhizomes yielded 0.65% essential oil; humulene, β-caryophyllene and their oxides constituted 70% of oil (*Flavour Fragrance J.* 1991, *6*, 261; *Chem. Abstr.* 1992, *116*, 135984 h); δ-cadinene and α-copaene isolated from tubers (*Kinki Daigaku Nogakubu Kiyo* 1994, *27*, 39; *Chem. Abstr.* 1994, *121*, 129922 y).

Distribution: Peninsular, central and eastern India.

C. stoloniferus Retz. syn. *C. juncifolius* Klein (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 89).

Aqueous extract dilated isolated uterus muscle of rat (*Tap Chi Duoc Hoc* 1993, 13; *Chem. Abstr.* 1993, *119*, 68111 t), decoction of rhizome and total alkaloids and essential oil exhibited analgesic effect in acetic acid writhing test; oral LD50 of essential oil in mice was 12.1 ml/kg (*Tap Chi Duoc Hoc* 1994, 16; *Chem. Abstr.* 1994, *121*, 73758 e).

Plant contained tannins (1.78), saponins and glycosides (1.27), flavonoids (0.78) and alkaloids (0.13%) (*Tap Chi Duoc Hoc* 1993, 13; *Chem. Abstr.* 1993, *119*, 68111 t).

C. tegetiformis Roxb.; see *C. corymbosus* Rottb.

C. tuberosus Rottb.; see *C. rotundus* L. ssp. *tuberosus* (Rottb.) Kuekenth.

CYPHOMANDRA (Solanaceae)

C. betacea (Cav.) Sendtn. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 253).

A new lectin - CBL1 - isolated from fruits and found to contain cysteine, glycine, glutamic acid, serine, proline and aspartic acid (*Plant Sci.* 1992, *81*, 183; *Chem. Abstr.* 1992, *116*, 148290 d).

CYSTOPTERIS (Athyriaceae)

C. fragilis (L.) Bernh. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 232).

A new pentaoxygenated xanthone isolated from aerial parts and characterised as 1,6-dihydroxy-3,5,7-trimethoxyxanthone (*Z. Naturforsch.* 1990, *45*B, 1603; *Chem. Abstr.* 1991, *114*, 98253 e); mangiferin, isomangiferin, 1,3,6,7-tetrahydroxyxanthone, 3-O-methylmangiferin, vicenin 2, 1-caffeylglucose-6-sulphate and 1-caffeylglucose-3-sulphate isolated (*Can. J. Bot.*

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1991, *69*, 218; *Chem. Abstr.* 1991, *114*, 182080 d); isolation and structure elucidation of 1,3-dihydroxy-5,6,7-trimethoxyxanthone (*J. Nat. Prod.* 1991, *54*, 603).

CYTISUS (Papilionaceae)

C. scoparius (L.) Link.;see *Sarothamnus scoparius* (L.) Wimm. ex W.D.J. Koch

DACTYLICAPNOS (Fumariaceae)

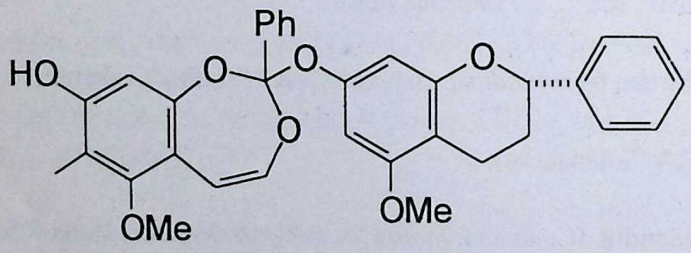
D. torulosa (Hook.f. & Thoms.) Hutch.; see *Dicentra torulosa* Hook.f. & Thoms.

DAEMONOROPS (Arecaceae)

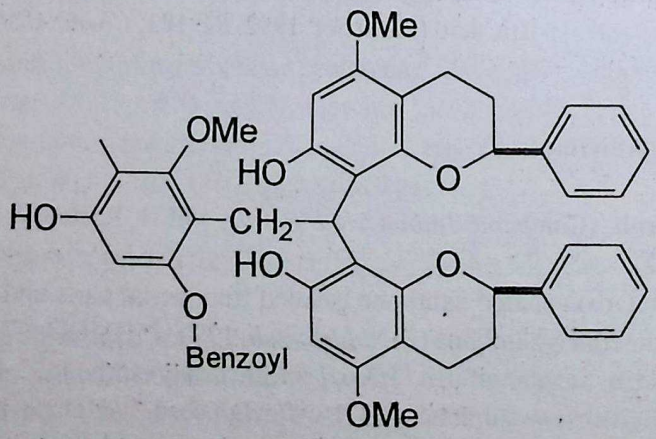
D. draco Blume (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 233).

A novel biflavonoid - dracooxepine - isolated from resin of fruits and its structure elucidated (*Heterocycles* 1989, *29*, 1119); a seco-triflavonoid - dracoflavan A - also isolated and characterised (*J. Chem. Soc.* Perkin 1 1990, 2637).

NEW COMPOUNDS



Dracooxepine



Dracoflavan A

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DALBERGIA (Papilionaceae)

D. latifolia Roxb. var. *sissoides* (Grah. ex Wt. & Arn.) Baker; see *D. sissoides* Grah. ex Wt. & Arn.

D. paniculata Roxb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 234).

Isolation of a new isoflavone - dalpalatin - from seeds and its characterisation; caviunin, isocaviunin and 3'-O-methylorobol also isolated (*Indian J. Chem.* 1990, *29*B, 78); seeds also afforded two new compounds - dalpaniculin and dehydrodalpanol-O-glucoside - along with (+)pinitol, caviunin-7-O-rhamnoglucoside and isocaviunin-7-O-glucoside; structures of new compounds determined (*Phytochemistry* 1991, *30,* 715); isolation of 6a,12a-dehydroamorphigenin from seeds (*Indian J. Chem.* 1992, *31*B, 472); (+)pinitol (0.018), β-sitosterol (0.013), triacontanol (0.01), 7-O-glucosylcaviunin (0.0035), 5-O-methylapigenin (0.0033), luteolin (0.002) and apigenin (0.0013%) determined in leaves (*Fitoterapia* 1992, *63,* 187).

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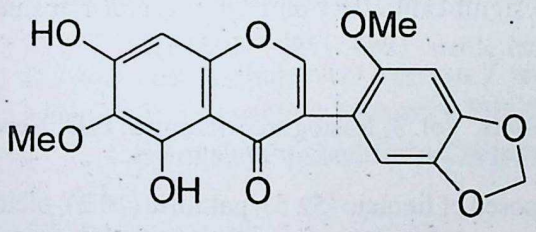
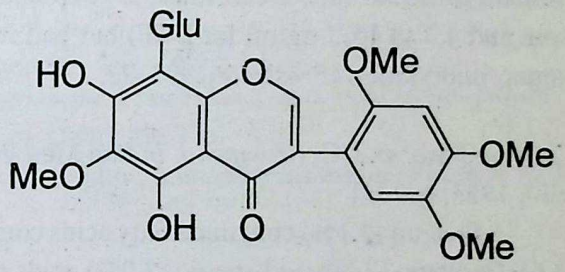
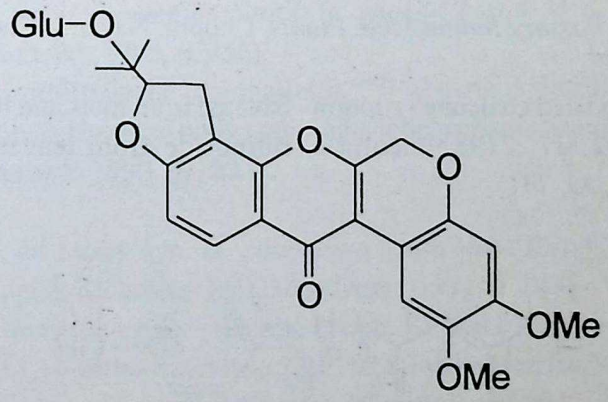


Dalpalatin



Dalpaniculin



Dehydrodalpanol-O-glucoside

D. sissoides Grah. ex Wt. & Arn. syn. *D. latifolia* Roxb. var. *sissoides* (Grah. ex Wt. & Arn.) Baker (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 254).

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A new quinone - sissoidenone - isolated from heartwood and its structure elucidated; dalbergenone, latifolin and dalbergin also isolated (*Indian J. Chem.* 1989, *28*B, 778); oleanolic acid, liquiritigenin and isoliquiritigenin identified in heartwood; β-sitosterol and latifolin in sapwood; biochanin A and kaempferol in young leaves, and sissotrin in sapwood as well as in young leaves (*Fitoterapia* 1990, *61*, 191).

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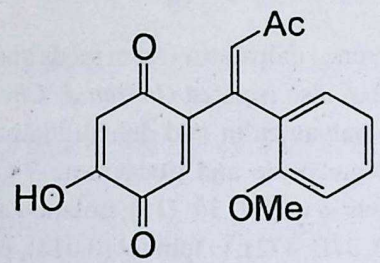


Sissoidenone

BIOLOGICAL ACTIVITY

Biochanin A inhibited both serum and epidermal growth factor (EGF)-stimulated growth of human prostrate cancer cell lines, LNCap and DU-145 (IC50 values 8.0 to 27.0 μg/ml for serum and 4.3 to 15.0 μg/ml for EGF) but had no significant effect on EGF receptor tyrosine autophosphorylation (*Prostrate* 1993, *22*, 335; *Chem. Abstr.* 1993, *119*, 131051 r).

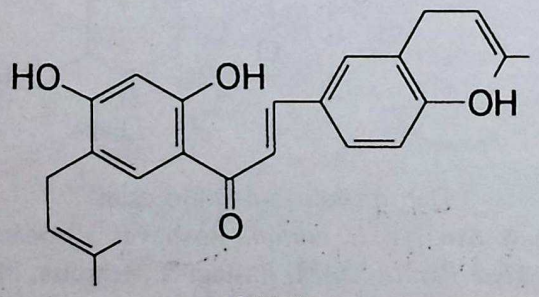
D. sissoo Roxb. ex DC. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 234).

Seed oil (4.1%) contained fatty acids composed of linoleic (52.5), palmitic (16.2), oleic (14.6), linolenic (9.80) and stearic (7.0%) acids and lipids comprising of neutral lipids (88.5), glycolipids (7.2) and phospholipids (4.0%) (*Indian J. Pharm. Sci.* 1993, *55*, 45).

D. stipulacea Roxb. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 90).

A new diprenylated chalcone - stipulin - isolated from roots and its structure determined (*Phytochemistry* 1992, *31*, 719); luteolin-4'-rutinoside from leaves along with luteolin (*Phytochemistry* 1993, *33*, 731).

NEW COMPOUNDS



Stipulin

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D. volubilis Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 255).

Synthesis of seshadrin (*Phytochemistry* 1991, *30,* 2438).

DAMNACANTHUS (Rubiaceae)

D. indicus Gaertn.f.

A new anthraquinone - 5-hydroxy-1,2-methylenedioxyanthraquinone - isolated from rhizomes of Japanese plant and its structure determined; in addition, damnacanthal, damnacanthol and juzunol isolated (*Phytochemistry* 1992, *31,* 709); three new anthraquinones - 1,3-dihydroxy-2-carboethoxy-9,10-anthraquinone, 1,3,5-trihydroxy-2-carboethoxy-9,10-anthraquinone and 1,5-dihydroxy-2-methoxy-9,10-anthraquinone - from roots and rhizomes and their characterisation (*J. Nat. Prod.* 1994, *57,* 1313).

Distribution: Assam hills.

DAPHNE (Thymelaeaceae)

D. acuminata Stocks; see *D. mucronata* Royle

D. bholua Buch.-Ham. ex D.Don syn. *D. cannabina* sensu Hook.f., p.p. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 147).

Isolation of umbelliferone, daphnetin, daphnoretin and genkwanin (*Fitoterapia* 1991, *62,* 91).

D. cannabina Hook.f.; see *D. bholua* Buch.-Ham. ex D.Don, *D. papyracea* Wall. ex Steud.

D. mucronata Royle syn. *D. acuminata* Stocks (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 256).

Apigenin, umbelliferone, daphnoretin, 7,3'-dimethoxyluteolin-5-glucoside, caryatin, pachypodol, α-amyrin, β-sitosterol and ursolic, oleanolic, vergatic, vanillic and p-methoxybenzoic acids isolated (*Fitoterapia* 1990, *61,* 281).

D. papyracea Wall. ex Steud. syn. *D. cannabina* sensu Hook.f., p.p. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 249).

Two new diterpene esters - daphne factors P1 and P2 - isolated from roots; factor P1 characterised as 9,13,14-orthobenzoate-12(2E,4E,6E-decatrienoate) of 6α,7α-epoxy-5β,12β-dihydroxyresiniferonol and the only difference in structure of factor P2 was located in alcohol moiety; the former having a 1,2-unsaturation whereas latter has a 1,2α-dihydro structure (*Phytother. Res.* 1993, *7,* 197; *Chem. Abstr.* 1993, *119,* 135606 y).

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DATURA (Solanaceae)

D. alba Nees; see *D. metel* L.

D. fastuosa L.; see *D. metel* L.

D. fastuosa L. var. *alba* (Nees) Clarke; see *D. metel* L.

D. ferox L.

A HPLC method for determination of hyoscyamine and scopolamine in seeds described (*Landwirtsch. Forsch.* 1989, *42,* 293; *Chem. Abstr.* 1990, *113,* 22311 f).
Distribution: Rajasthan.

D. innoxia Mill. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 256).

Two alkaloids - α- and β-scopodonnines - isolated from seeds and characterised (*Khim. Prir. Soedin.* 1991, 532; *Chem. Abstr.* 1992, *117,* 248533 z).
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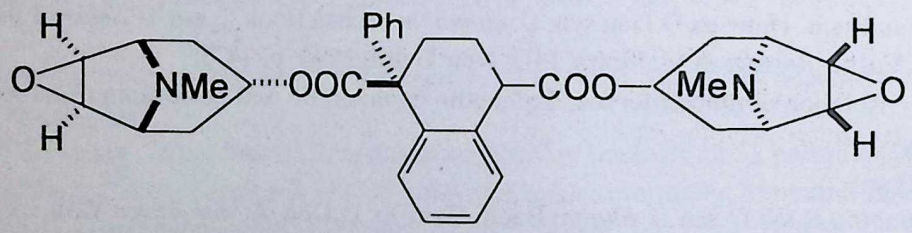

β-Scopodonnine

D. metel L. syn. *D. fastuosa* L., *D. fastuosa* L. var. *alba* (Nees) Clarke, *D. alba* Nees (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 256).

Single oral administration of aqueous extract of seed significantly decreased RBC, WBC, haemoglobin %, fasting blood sugar, proteins and level of cholesterol. Concentration of Na^+ and K^+ in serum and activity of acid and alkaline phosphatases remained unchanged. Activity of SGPT remained high even after 20 days of treatment. Changes were more apparent 2-3 days after administration which latter returned to normal (*Arogya* 1990, *16,* 52).

New withanolide - daturametelin D - isolated from fresh aerial parts and its crystal structure determined (*Chem. Pharm. Bull.* 1989, *37,* 2132; *ibid.* 1990, *38,* 2866); daturametelins C, E, F and G as acetyl derivative isolated and characterised (*Chem. Pharm. Bull.* 1989, *37,* 2132); an alkaloid, possibly a configurational isomer of hyoscine, isolated from seeds (*Indian J. Pharmacol.* 1991, *23,* 177); isolation of another withanolide - withametelin B - from leaves and its structure elucidation; in addition, 12-deoxywithastramonolide and physalindicanol A isolated (*J. Nat. Prod.* 1991, *54,* 599); isolation of three more new withanolides - withametelins C, D and

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E - and their characterisation; lycium substance B and p-hydroxycinnamic acid amide of tyramine also isolated (*Phytochemistry* 1992, *31*, 2423); flowers afforded new withanolides - withametelins F and G - whose structures established (*J. Chem. Res. Synop.* 1993, 234; *Chem. Abstr.* 1993, *119*, 271480 e); two more withanolides - withafastuosins A and B - isolated from leaves along with withametelin and characterised (*Phytochemistry* 1993, *34*, 868).

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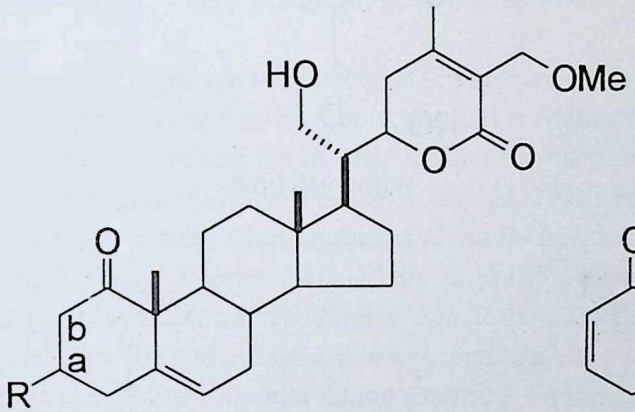
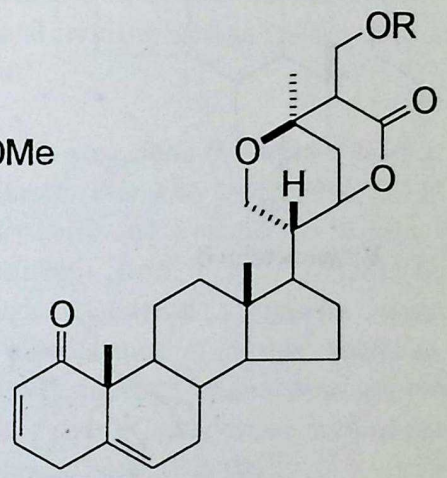
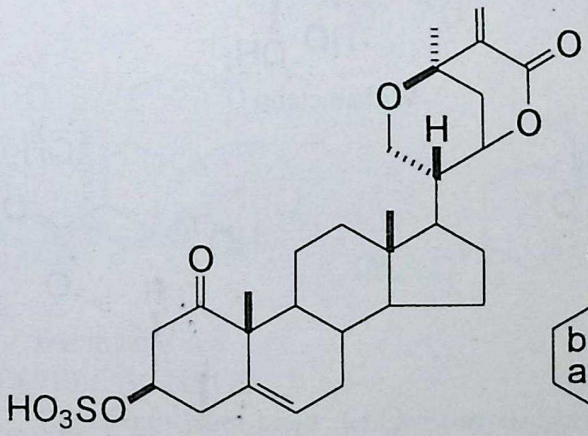


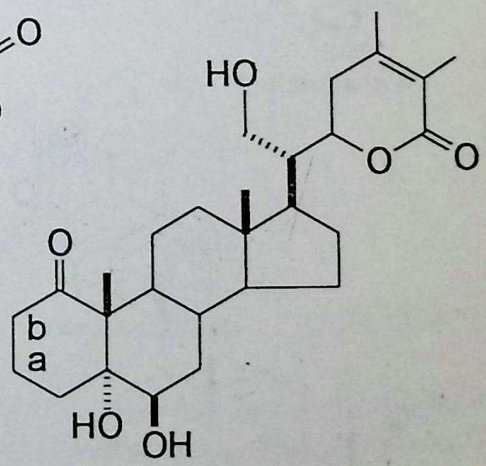
Daturametelin C
R = H, ab = Δ
Daturametelin E
R = β-OSO_3H



Daturametelin D
R = Me
Daturametelin G
R = Glu



Daturametelin F



Withametelin C
Withametelin D
ab = Δ

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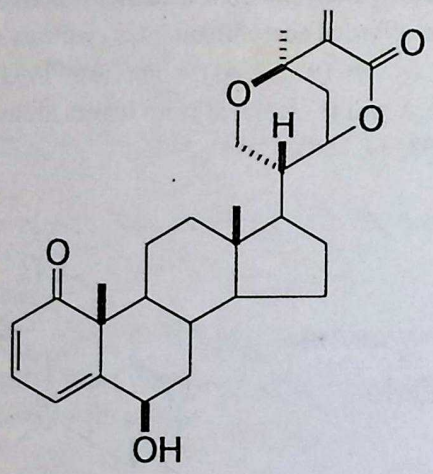
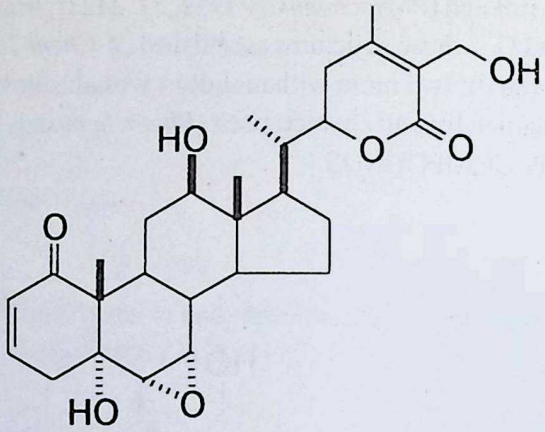
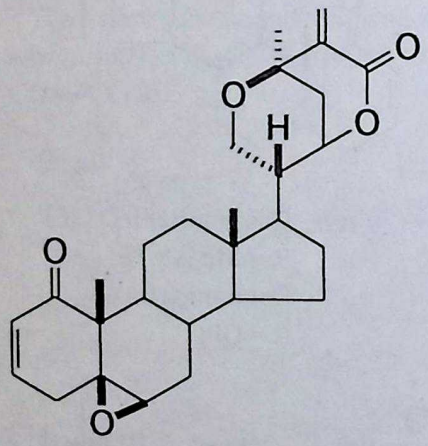


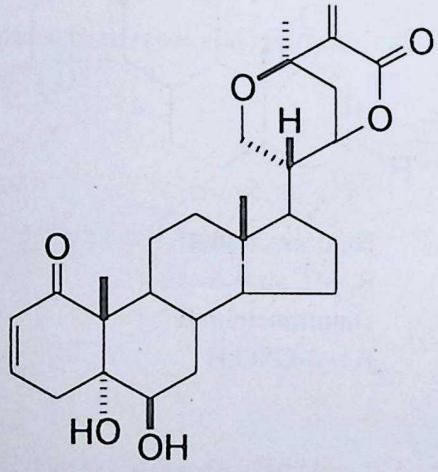
Withametelin B



Withametelin E



Withametelin F



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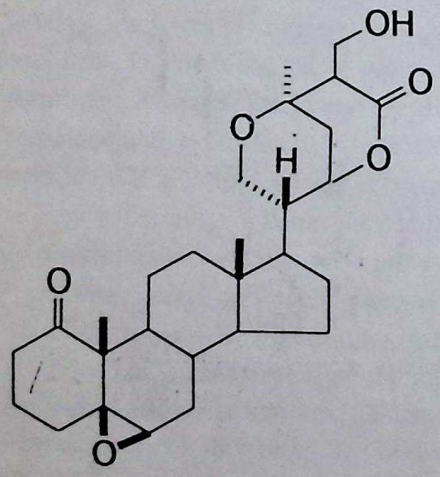
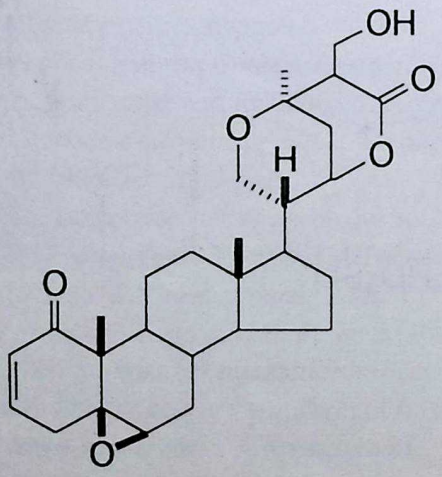


Withafastuosin A



Withafastuosin B

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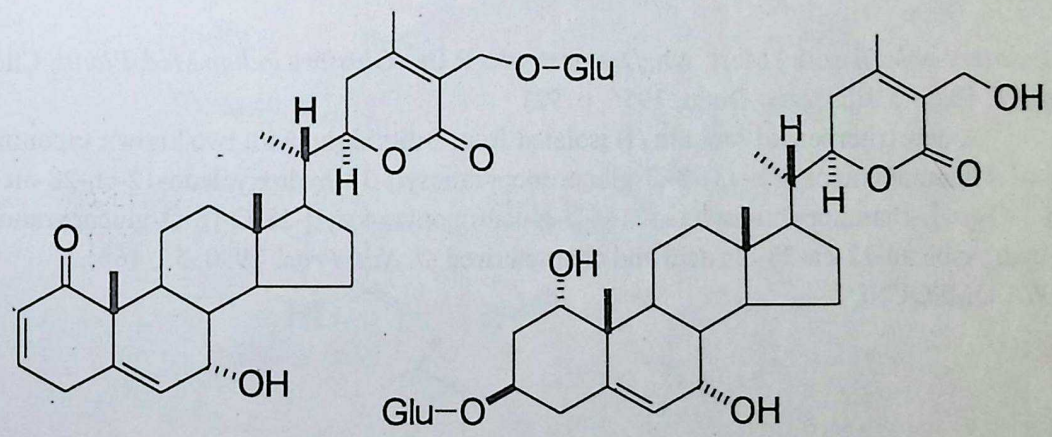
BIOLOGICAL ACTIVITY

Scopolamine (0.2 mg, i.v.) exaggerated response of heart rate to standing up from supine position in healthy human males; it also increased ECG R-R variance during standing condition and caused dryness of mouth. Thus, effects of scopolamine in low doses on above cardiac variables are vegomimetic (*Psychopharmacol.* 1992, *7,* 199; *Chem. Abstr.* 1992, *117,* 184564 a); scopolamine facilitated performance of avoidance task in normal animals and in those with frontal cortex lesions and also increased number of intertrial responses. Scopolamine treatment seems to induce a long lasting recovery process in frontal cortex ablated animals (*Behav. Brain Res.* 1994, *62,* 135; *Chem. Abstr.* 1994, *121,* 221748 u).

D. stramonium L. var. *stramonium* syn. *D. stramonium* L. var. *tatula* (L.) Clarke, *D. tatula* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 259).

A HPLC method for determination of hyoscyamine and scopolamine in seeds from feeds described (*Landwirtsch. Forsch.* 1989, *42,* 293; *Chem. Abstr.* 1990, *113,* 22311 f); two new steroidal glycosides - daturataturins A and B - isolated from aerial parts and their structures determined (*Chem. Pharm. Bull.* 1990, *38,* 3485); identification of chrysin, quercetin and kaempferol in leaves (*Indian J. Pharm. Sci.* 1991, *53,* 94); palmitic, stearic, oleic and linoleic acids as major acids and myristic, linolenic and arachidic acids as minor ones identified by GLC in seeds of plant from Vidarbha region (*Indian J. Pharm. Sci.* 1992, *54,* 105).

NEW COMPOUNDS



Daturataturin A Daturataturin B

BIOLOGICAL ACTIVITY

Agglutinin from plant induced intracellular calcium mobilization and cytoskeletal changes by recognising N-acetylglucosamine oligomer residues of specific glycoproteins of mast cells (*Jap. J. Pharmacol.* 1994, *66,* 205).

D. stramonium L. var. *tatula* (L.) Clarke; see *D. stramonium* L. var. *stramonium*

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D. tatula L.; see *D. stramonium* L. var. *stramonium*

DAUCUS (Apiaceae)

D. carota L. syn. *D. carota* L. ssp. *carota* (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 259).

Detection of 1-cyclohexenyl-propan-2-one, benzyl acetate, pulegone, β-sesquiphellandrene, β-santalene and δ-guaiene in essential oil; N-phenyl-2-naphthylamine and asarone isolated; γ-bisabolene synthesised and found to be mixture of (Z)- and (E)-forms (*Huadong Huagong Xueyuan Xuebao* 1989, *15,* 777; *Chem. Abstr.* 1990, *113,* 55880 u); a carotenoid-protein complex containing α- and β-carotenes and lutein as major carotenoids isolated from roots (*J. Agric. Food Chem.* 1994, *42,* 2386; *Chem. Abstr.* 1994, *121,* 254289 y).

D. carota L. ssp. *carota*; see *D. carota* L.

D. carota L. ssp. *sativus* (Hoffm.) Arcang. (*sativa*) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi, & Mehrotra, PID, New Delhi, 1995, p. 260).

Determination of falcarinol (n-heptadeca-1,9-dien-4,6-diyn-3-ol) in roots (*Han'guk Nonghwa Hakhoechi* 1990, *33,* 120; *Chem. Abstr.* 1991, *114,* 58933 v).

DEERINGIA (Amaranthaceae)

D. amaranthoides (Lamk.) Merr. syn. *D. celosioides* R.Br. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 92).

A new triterpenoid saponin (I) isolated from fruits along with two known saponins, 3-O-[α-L-rhamnopyranosyl(1→3)-β-D-glucuronopyranosyl]-3β-hydroxyolean-12-en-28-oic acid and 3-O-[α-L-rhamnopyranosyl(1→3)-β-D-glucuronopyranosyl]-28-O-[β-D-glucopyranosyl]-3β-hydroxyolean-12-en-28-oic acid and characterised (*J. Nat. Prod.* 1990, *53,* 466).

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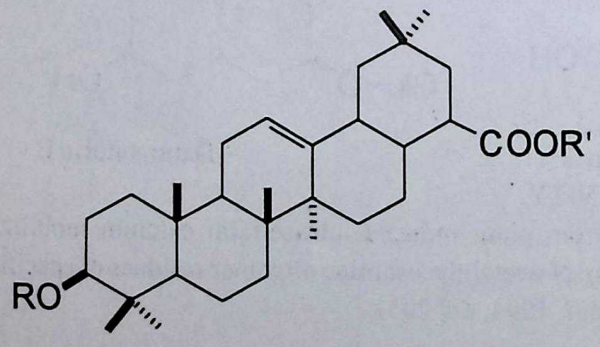

I

R = Gluc.acid(3→1)Rha, R' = Glu(2→1)Xyl

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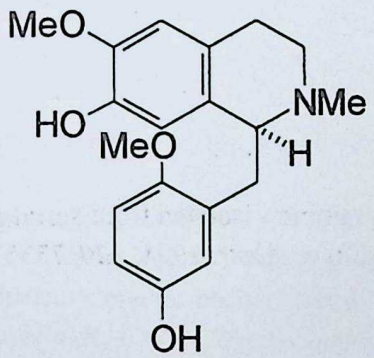
D. celosioides R.Br.; see *D. amaranthoides* (Lamk.) Merr.

DEHAASIA (Lauraceae)

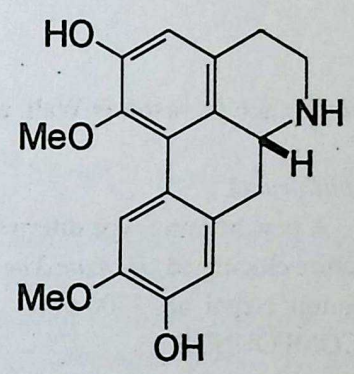
D. kurzii King (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 260).

A new phenolic alkaloid (I) isolated from aerial parts and its structure elucidated (*Chittagong Univ. Stud.* Part 2, 1988, *12,* 11; *Chem. Abstr.* 1990, *112,* 95569 k); isolation of two new alkaloids - dehassiline and (–)norboldine - from bark and their characterisation (*Fitoterapia* 1991, *62,* 261).

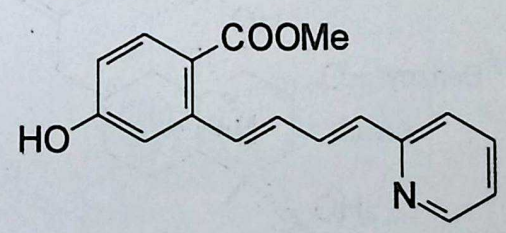
NEW COMPOUNDS



Dehassiline



(-)Norboldine



I

DELPHINIUM (Ranunculaceae)

D. ajacis L.; see *Consolida ambigua* (L.) Ball. & Heywood

D. caeruleum Jacq. ex Camb. (*coeruleum*) (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 92).

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A new diterpenoid alkaloid - caeruline - isolated and its structure determined; in addition tatsiensine, delcosine and lycoctonine isolated (*Gaodeng Xuexiao Huaxue Xuebao* 1992, *13*, 1418; *Chem. Abstr.* 1993, *118*, 230174 u; *Planta Med.* 1993, *59*, 83).

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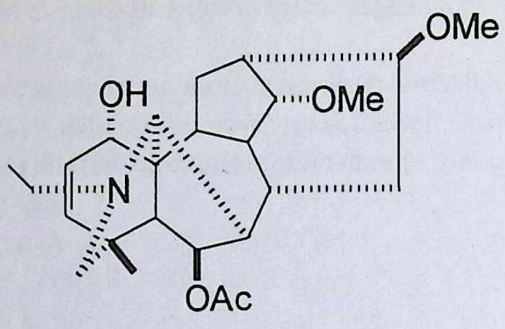

Caeruline

D. elatum L.; see *D. vestitum* Wall. ex Royle

D. grandiflorum L.

A new hetisine-type diterpenoid alkaloid - delgramine - isolated from aerial parts and its structure elucidated (*Huaxue Xuebao* 1993, *51*, 915; *Chem. Abstr.* 1994, *120*, 73352 x).

Distribution: Nepal, alt. 3700 m.

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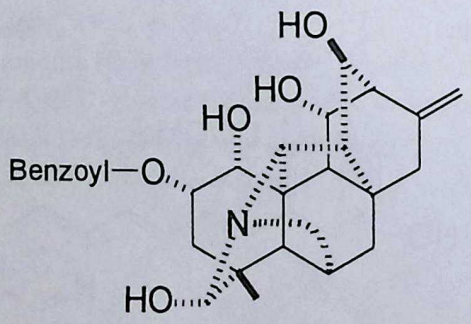

Delgramine

D. semibarbatum Blenert ex Boiss. syn. *D. zalil* Aitch. & Hemsl. (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 92).

A norditerpenoid alkaloid - zaliline - isolated from seeds and its structure determined; anhweidelphinine, browniine, nudicauline and its desacetyl derivative, lycoctonine and methyllycaconitine also isolated (*Phytochemistry* 1992, *31*, 3247).

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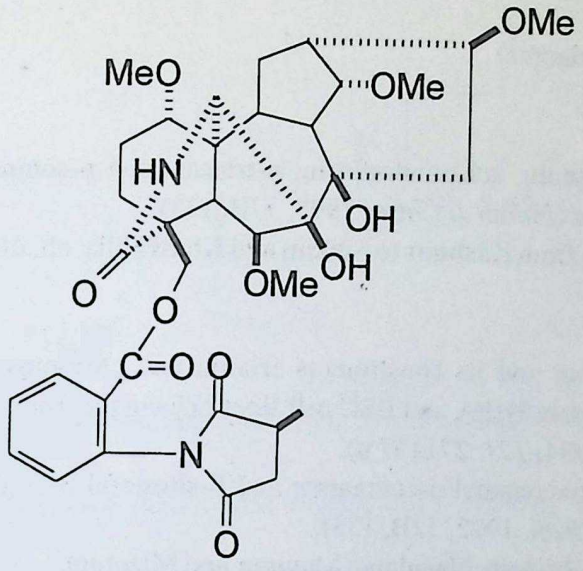

Zaliline

D. speciosum Janka ex Nym.; see *D. vestitum* Wall. ex Royle

D. vestitum Wall. ex Royle syn. *D. elatum* auct. (non L.), *D. speciosum* Janka ex Nym. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 262).

Structure and stereochemistry of norditerpenoid - delvestine - confirmed by X-ray analysis (*Acta Crystallogr., Cryst. Struct. Commun.* 1990, *46*C, 1707; *Chem. Abstr.* 1991, *114,* 6910 r); isolation of a new norditerpenoid alkaloid - isodelectine - and its structure elucidation; anthranoyllycoctonine also isolated (*J. Nat. Prod.* 1990, *53,* 1606).

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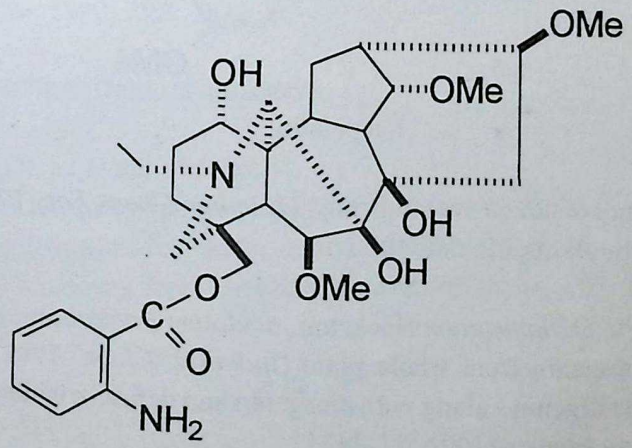

Isodelectine

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D. zalil Aitch. & Hemsl.; see *D. semibarbatum* Blenert ex Boiss.

DENDROBIUM (Orchidaceae)

D. bicameratum Lindl.

Moscatin, diosgenin, schizandraflorin, n-triacontanyl p-coumarate and β-sitosterol isolated from whole plant (*Indian J. Chem.* 1992, *31*B, 133).

Distribution: Himalayas, from Kashmir to Sikkim and Khasi Hills, alt. 600 m.

D. chrysotoxum Lindl.

Alcoholic extract and its constituents erianin and chrysotoxene exhibited marked antitumor activity on mouse HePA and ESC cell lines (*Zhongguo Yaoke Daxue Xuebao* 1994, *25*, 188; *Chem. Abstr.* 1994, *121*, 271457 u).

Diosgenin, n-triacontanyl p-coumarate and β-sitosterol-β-D-glucoside isolated from whole plant (*Indian J. Chem.* 1992, *31*B, 133).

Distribution: Arunachal Pradesh, Nagaland, Manipur and Mizoram.

D. crepidatum Lindl. & Paxt. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 257).

Isolation of a new bibenzyl derivative - crepidatin - and its structure elucidation (*Phytochemistry* 1989, *28*, 1986).

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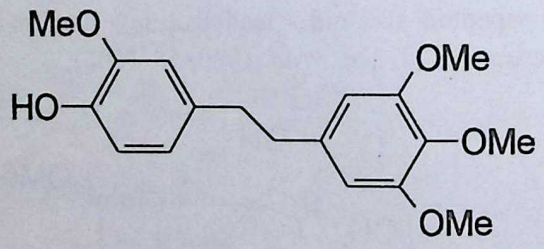

Crepidatin

D. farmerii Paxt.

Revised structure of dengibsin confirmed (*J. Indian Chem. Soc.* 1989, *66*, 834).

Distribution: Eastern Himalayas, alt. 600-1000 m.

D. fimbriatum Hook. syn. *D. fimbriatum* Hook. var. *aculatum* Hook. (*aculata*)

Isolation of diosgenin from whole plant (*Indian J. Chem.* 1992, *31*B, 133); a new diosgenin derivative - denfigenin - along with diosgenin and defuscin isolated from whole plant and characterised (*Phytochemistry* 1992, *31*, 2431).

Distribution: Himalayas, from Kumaon to Sikkim, Khasi Hills and Manipur, alt. 500-1800 m.

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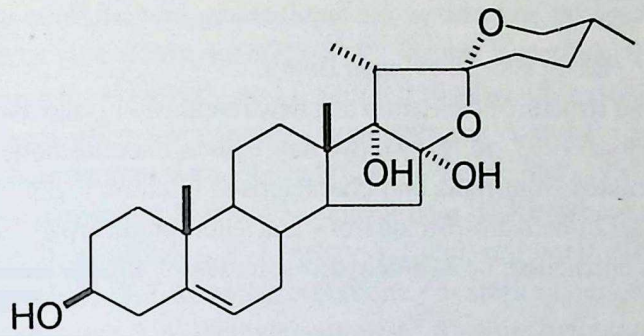


Denfigenin

D. fimbriatum Hook. var. *aculatum* Hook.; see *D. fimbriatum* Hook.

D. nobile Lindl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 264).

Manool identified as major component in stem essentail oil (*Youji Huaxue* 1991, *11,* 219; *Chem. Abstr.* 1991, *115,* 68440 s); synthesis of (–)dendrobine (*J. Am. Chem. Soc.* 1991, *113,* 670).

D. rotundatum (Lindl.) Hook.f.; see *Epigenium rotundatum* (Lindl.) Summ.

DENDROPHTHOE (Loranthaceae)

D. falcata (L.f.) Etting. syn. *Loranthus longiflorus* Desr. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 265).

Quercitrin isolated as major constituent from plant growing on different host plants (*Indian J. Chem.* 1990, *29*B, 584).

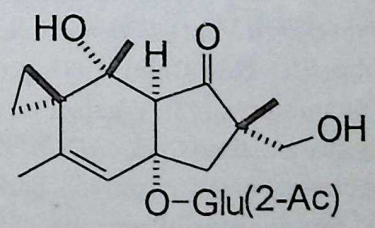
DENNSTAEDTIA (Dennstaedtiaceae)

D. scabra (Wall. ex Hook.) Moore

A new illudane-type sesquiterpene glycoside - dennstoside A - isolated and characterised as analogue of ptaquiloside (*Phytochemistry* 1991, *30,* 2080).

Distribution: Himalayas, from Himachal Pradesh to Sikkim, Meghalaya and Assam

NEW COMPOUNDS



Dennstoside A

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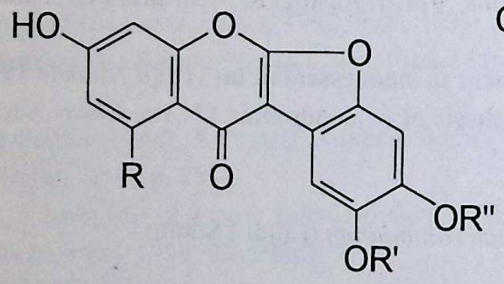
DERRIS (Papilionaceae)

D. canarensis (Dalz.) Baker syn. *D. oblonga* Benth.

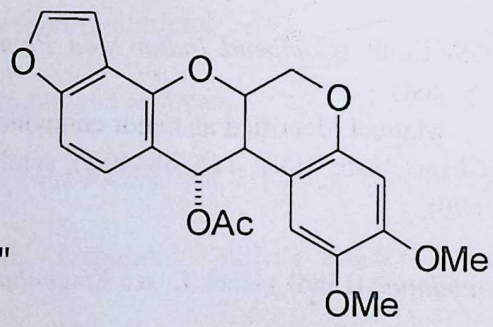
Isolation and structure elucidation of a new rotenone -12-deoxo-12α-acetoxyelliptone - from roots (*J. Nat. Prod.* 1993, *56,* 1187); two new coumaronochromone derivatives - oblongin and oblonginol - isolated from roots and characterised (*Heterocycles* 1993, *36,* 1501); a new dehydrorotenoid - 6a,12a-dehydro-β-toxicarol - and a new pterocarpan - derricarpin - from roots and their structures elucidated; 6a,12a-dehydro-α-toxicarol also isolated (*Chem. Pharm. Bull.* 1993, *41,* 1456).

Distribution: Peninsular India, in plains.

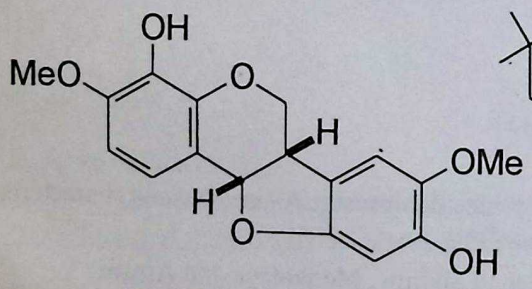
NEW COMPOUNDS



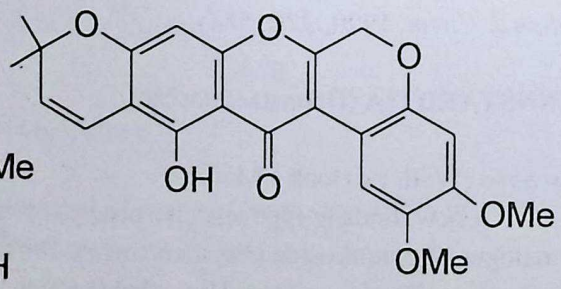
Oblongin
R,R" = H, R' = Me
Oblonginol
R = OH, R' = H, R" = Me



12-Deoxo-12α-acetoxyelliptone



Derricarpin



6a,12a-Dehydro-β-toxicarol

D. indica (Lamk.) Bennet syn. *Pongamia glabra* Vent., *P. pinnata* (L.) Pierre (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 266).

A polysaccharide consisting of arabinose (43.9), galactose (23.1) and glucuronic acid (23.5%) isolated from gum and partially characterised (*Indian J. Chem.* 1990, *29*B, 545); isolation of two new β-hydroxychalcones - ponganones I and II - from root bark and their characterisation (*Chem. Pharm. Bull.* 1991, *39,* 1473); new chromenoflavanone - (-) isoglabrachromene - and

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two new esters - hexacosanyl caffeate and triacontanyl caffeate - isolated and their structures determined; in addition, betulinic acid, glabrachromene, ovalitenone, pongachromene, 5-methoxy-3',4'-methylenedioxy-2",2"-dimethylpyrano(7,8-6",5")flavone, lanceolatin B, karanjin, pongapin, glabra-II, kanugin, desmethoxykanugin and fisetin tetramethyl ether isolated (*Phytochemistry* 1991, *30,* 3834); two new phenylpropanoids - pongapinones A and B - isolated from bark of Indonesian plant and their structures established (*Chem. Pharm. Bull.* 1992, *40,* 2041); root bark of Japanese plant afforded nine new flavonoids - ponganones III-XI - whose structures elucidated; in addition, ovalitnin B, ovalifolin, 2'-hydroxy-3,4,4',6'-tetramethoxychalcone, dihydro-milletenone methyl ether, 3,7-dimethoxyflavone, 5-methoxy-6",6"-dimethylpyrano-[2",3":7,8]flavone, 5-methoxy-3',4'-methylenedioxy-6",6"-dimethylpyrano[2",3":7,8]flavone, [2",3":7,8]furanoflavone and 3',4'-dimethylpyrano[2",3":7,8]furanoflavone isolated (*Phytochemistry* 1992, *31,* 993); isolation of two new flavone glycosides from heartwood and their characterisation as 3,5,7,4'-tetrahydroxy-6,8,3'-trimethoxyflavone-3-O-[α-L-arabinopyranosyl(1→3)]-β-D-galactopyranoside and 3,5,7,4'-tetrahydroxy-6,8,3'-trimethoxyflavone-3-O-[{α-L-arabinopyranosyl(1→3)}{β-D-galactopyranosyl(1→6)}]-β-D-galactopyranoside (*Int. J. Pharmacog.* 1993, *31,* 305; *Chem. Abstr.* 1994, *120,* 212598 x).

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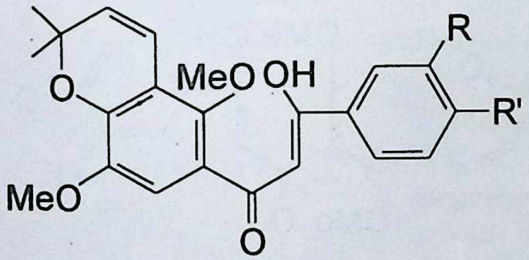
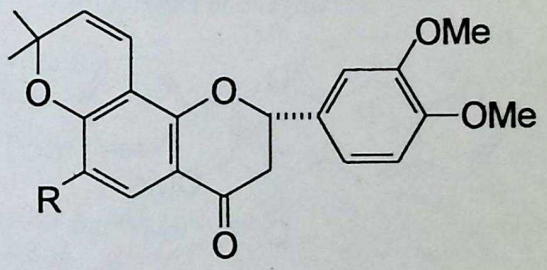
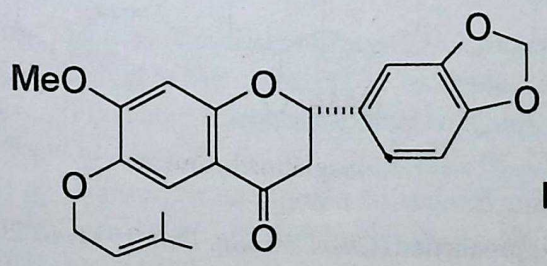


Ponganone I
R,R' = H
Ponganone II
RR' = -OCH$_2$O-



Ponganone III
R = H
Ponganone IV
R = OMe



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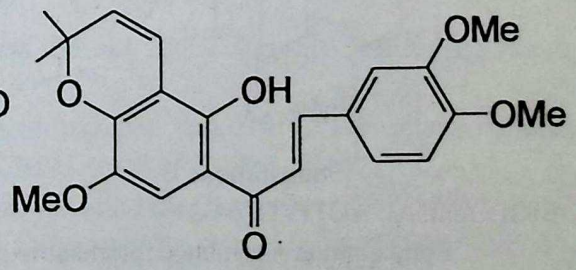

Ponganone VI

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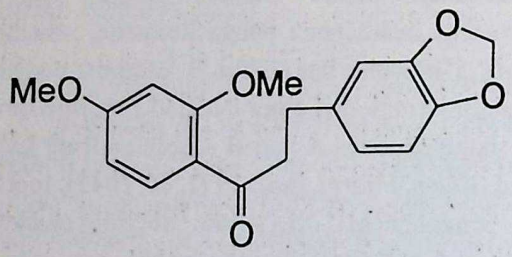

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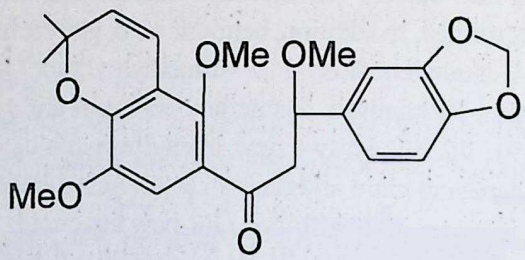

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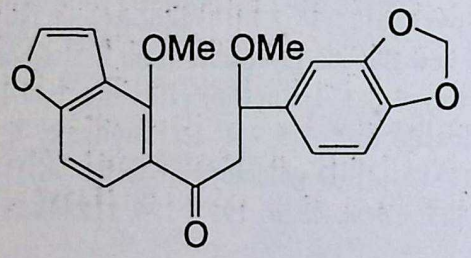

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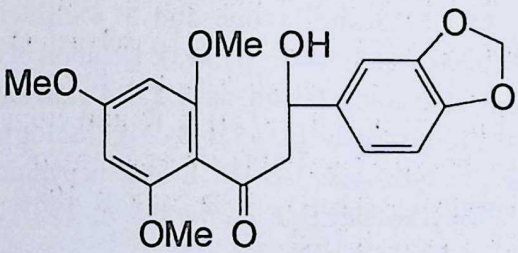
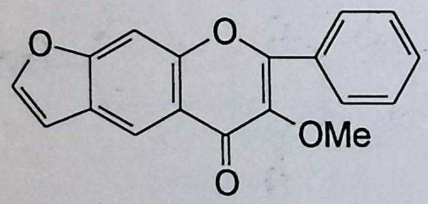
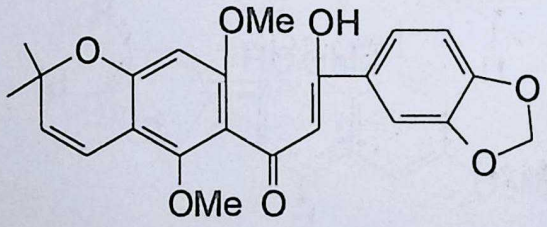


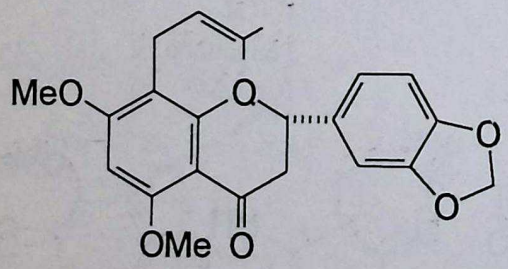
Ponganone X



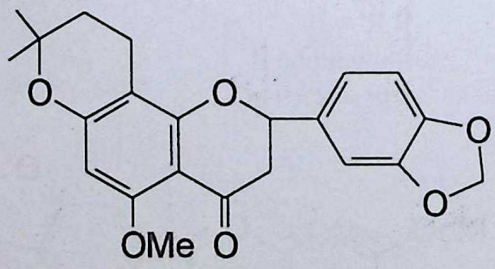
Ponganone XI



Pongapinone A



Pongapinone B



Isoglabrachromene

BIOLOGICAL ACTIVITY

Pongapinone A inhibited interleukin-1 production (*Chem. Pharm. Bull.* 1992, *40*, 2041).

D. oblonga Benth.; see *D. canarensis* (Dalz.) Baker

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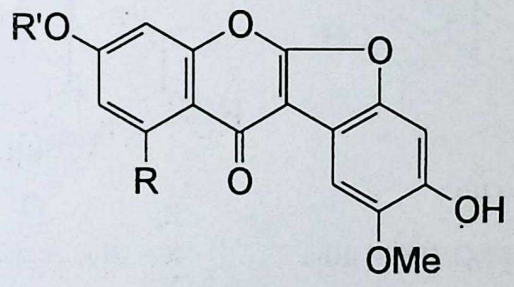
DESMODIUM (Papilionaceae)

D. capitatum (Burm.f.) DC.; see *D. styracifolium* (Osbeck) Merr.

D. elegans DC. ssp. *elegans* var. *elegans* syn. *D. tiliaefolium* (D.Don) Wall. ex G.Don (*tiliifolium*) p.p., *D. oxyphyllum* Baker (non DC.), *D. oxyphyllum* Baker var. *serriferum* Baker (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 262).

Four new coumaronochromones - desmoxyphyllins A and B and their 7-O-glucopyranosides - isolated from leaves and their structures determined (*Phytochemistry* 1992, *31,* 361).

NEW COMPOUNDS



Desmoxyphyllin A
R = OH, R' = H
Desmoxyphyllin B
R,R' = H
Desmoxyphyllin A-7-O-glucoside
R = OH, R' = Glu
Desmoxyphyllin B-7-O-glucoside
R = H, R' = Glu

D. oxyphyllum DC.; see *D. elegans* DC. ssp. *elegans* var. *elegans*

D. oxyphyllum Baker var. *serriferum* Baker; see *D. elegans* DC. ssp. *elegans* var. *elegans*

D. styracifolium (Osbeck) Merr. syn. *D. capitatum* (Burm.f.) DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 267).

Flavanoid fraction of extract containing schaftoside, effective for prevention of kidney stones in rats (Jpn. 1,305,080 (1989) Dec. 08; *Chem. Abstr.* 1990, *113,* 29240 r).

A triterpenoid saponin (I) isolated and characterised (Jpn. 1,301,688 (1988) May 31; *Chem. Abstr.* 1990, *113,* 84820 e); schaftoside and related flavonoids isolated (Jpn. 1,305,080 (1989) Dec. 08; *Chem. Abstr.* 1990, *113,* 29240 r); isolation of one more saponin (II) and its characterisation as 3-O-[α-L-rhamnopyranosyl(1→2)-β-D-galactopyranosyl(1→2)-β-D-glucuronopyranosyl]soyasapogenol E along with soyasaponin I (*Chem. Pharm. Bull.* 1989, *37,*

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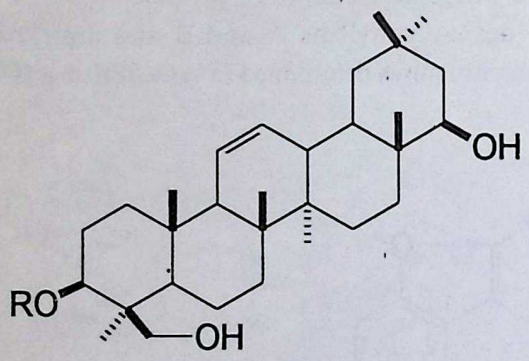
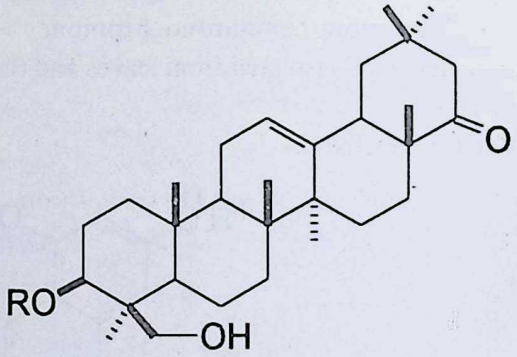
2229); isolation of isovitexin, isoorientin and glycosides of vicenin (*Zhongcaoyao* 1993, *24*, 343; *Chem. Abstr.* 1993, *119*, 245580 t); desmodimine and desmodilactone isolated from aerial parts and their structures elucidated; in addition, lupenone, lupeol, tritriacontane, β-sitosterol, stearic acid and eicosanoic acid eicosyl ester isolated (*Yaoxue Xuebao* 1993, *28*, 197; *Chem. Abstr.* 1993, *119*, 156209 m).

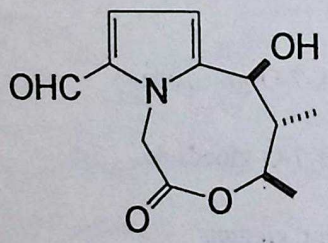
NEW COMPOUNDS



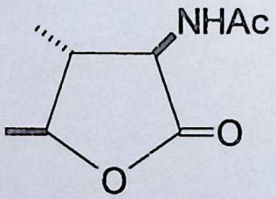
I
R = Gluc.acid(4→1)Gal(2→1)Rha



II
R = Gluc.acid(2→1)Gal(2→1)Rha



Desmodimine



Desmodilactone

BIOLOGICAL ACTIVITY

Feeding of triterpenoid saponin (I) to rats markedly increased excretion of citric acid and creatinine in urine and, thus, useful in preventing kidney stones (Jpn: 1,301,688 (1988) May 31; *Chem. Abstr.* 1990, *113*, 84820 e).

D. tiliaefolium (D.Don) Wall. ex G.Don (*tiliifolium*); see *D. elegans* DC. ssp. *elegans* var. *elegans*

D. triquetrum (L.) DC. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 95).

Isolation of friedelin, epifriedelinol and stigmasterol (*Zhiwu Xuebao* 1989, *31*, 128; *Chem. Abstr.* 1990, *112*, 73883 f).

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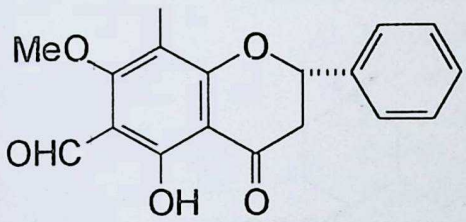
DESMOS (Annonaceae)

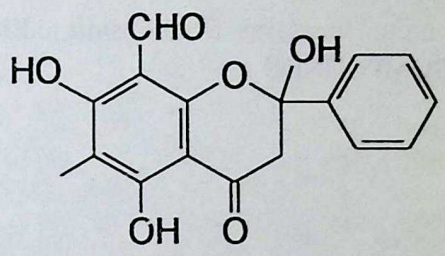
D. chinensis Lour. syn. *Unona discolor* Vahl (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 267).

4,7-Dihydroxy-5-methoxy-6-methyl-8-formylflavone and 5,7-dihydroxy-6,8-dimethyldihydroflavone isolated from roots (*Yunnan Zhiwu Yanjiu* 1992, *14,* 97; *Chem. Abstr.* 1992, *117,* 86757 w); a flavonoid tyrosine kinase inhibitor - desmal - isolated and its structure elucidated (*FEBS Lett.* 1993, *320,* 169; *Chem. Abstr.* 1993, *119,* 85539 f); another flavanone - cochinine A - isolated from stems and characterised; desmethoxymatteucinol, negletein and lawinal also isolated (*Yunnan Zhiwu Yanjiu* 1993, *15,* 295; *Chem. Abstr.* 1994, *120,* 101929 m).

NEW COMPOUNDS



Cochinine A



Desmal

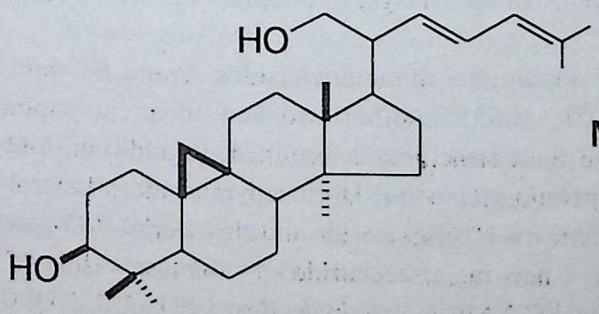
BIOLOGICAL ACTIVITY

Desmal inhibited tyrosine kinase in situ in epidermal growth factor (EGF) receptor overexpressing NIH3T3 (ERIZ) cells. It also inhibited EGF-induced inositol phosphate formation and morphological changes (*FEBS Lett.* 1993, *320,* 169; *Chem. Abstr.* 1993, *119,* 85539 f).

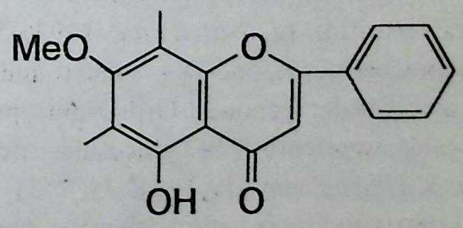
D. cochinchinensis Lour. syn. *Unona desmos* Raeusch. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 267).

A new cycloartane triterpenoid - desmosinol - isolated from stem and its structure determined (*Nat. Prod. Lett.* 1992, *1,* 109; *Chem. Abstr.* 1994, *120,* 27449 m); isolation and structure elucidation of a new flavone - desmosflavone - from roots (*Chinese Chem. Lett.* 1994, *5,* 211; *Chem. Abstr.* 1994, *121,* 104123 a)

NEW COMPOUNDS



Desmosinol



Desmosflavone

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D. longiflorus (Roxb.) Safford syn. *Unona longiflora* Roxb.

A new triterpenoid isolated from stem bark and characterised as 15α-hydroxy-24-methylenelanosta-7,9(11)-dien-3-one (*Phytochemistry* 1994, *36, 1337*).

Distribution: Assam and Meghalaya, alt. upto 900 m.

DEUTZIA (Philadelphaceae)

D. compacta Craib syn. *D. corymbosa* sensu Hook.f., p.p. (non R.Br.)

Isolation of two new echinocystic acid glycosides - deutzicosides A and B - and their structure determination; umbelliferone and sitosterol-β-D-glucoside also isolated (*Phytochemistry* 1991, *30,* 2798).

Distribution: Himalayas, from Kasmir to Bhutan, alt. 2000-3400 m.

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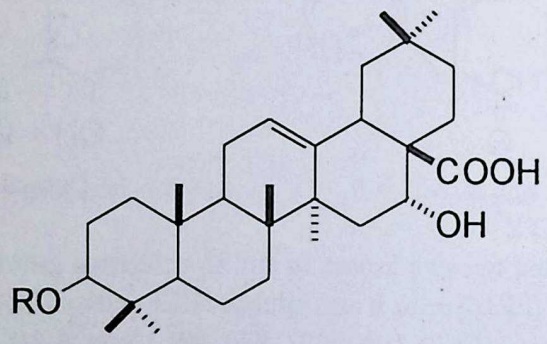

Deutzicoside A
R = Ara(4→1)Ara
Deutzicoside B
R = Ara(4→1)Rha(4→1)Gal

D. corymbosa Hook.f.; see *D. compacta* Craib

DIANTHUS (Caryophyllaceae)

D. chinensis L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 95).

Isolation of two new oleanene saponins - dianchinenosides A and B - and their characterisation (*J. Nat. Prod.* 1993, *56,* 1065); another two new oleanene saponins - dianchinenosides C and D - isolated and their structures determined; in addition, 3-O-α-L-arabinosyl-hederagenin-28-O-β-D-glucopyranosyl(1→6)-β-D-glucopyranoside, sitosterol-β-D-glucoside, isoorientin-2"-O-glucoside, isovitexin-2"-O-glucoside and chrysoeriol-7-O-glucoside isolated (*Phytochemistry* 1994, *35,* 751); a new monosaccharide - (–)dianose - isolated from aerial parts and its structure determined by ^{13}C-NMR (*Carbohydr. Res.* 1994, *252,* 303; *Chem. Abstr.* 1994, *120,* 294152 j).

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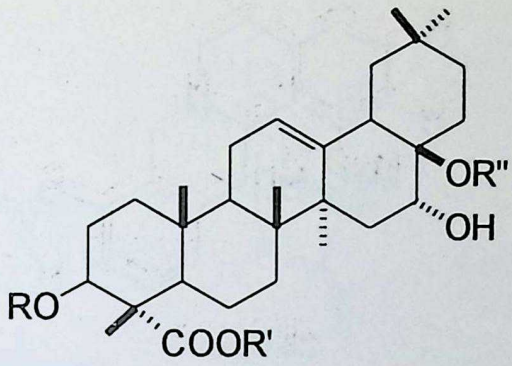

Dianchinenoside A
R = Ara, R' = H, R" = Glu
Dianchinenoside B
R = Xyl, R' = H, R" = Glu
Dianchinenoside C
R = H, R', R" = Glu
Dianchinenoside D
R,R' = H, R" = Glu(6→1)Glu

DICENTRA (Fumariaceae)

D. spectabilis Lem. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 245).

A new quaternary alkaloid - (–)cis-N-methylcheilanthifolinium chloride - along with protopine, sanguinarine chloride, choline chloride, (–)cis-N-methylstylopinium chloride and magnocurarine isolated from rhizomes; in addition, palmatine identified by HPLC (*Shoyakugaku Zasshi* 1992, *46,* 109; *Chem. Abstr.* 1993, *118,* 19189 v).

D. torulosa Hook.f. & Thoms. syn. *Dactylicapnos torulosa* (Hook.f. & Thoms) Hutch.

A new alkaloid - zijinlongine - isolated from whole plant and characterised; 1-methoxyberberinium chloride, triethylphenylammonium chloride and isocorydine also isolated (*Yaoxue Xuebao* 1990, *25,* 604; *Chem. Abstr.* 1991, *114,* 160667 y); four new alkaloids - isoapocavidine, torulosine, torulosinine and oxocoryrutine - isolated from whole plant and their structures determined; in addition, norsanguinarine, 8-acetonyl-dihydrosanguinarine, oxosanguinarine, α-hydrastine, apocavidine, adlumidine, bicuculline, cheilanthifoline, β-hydrastine, demethylcorydalmine, protopine, fumaridine, hunnemanine, 1-methoxyberberinium chloride, N-trans-feruloyltyramine, N-methylhydrasteine, its methyl ester and hydroxylactam and isolated (*Phytochemistry* 1994, *36,* 519).
Distribution: Meghalaya, alt. 1200-1600 m.

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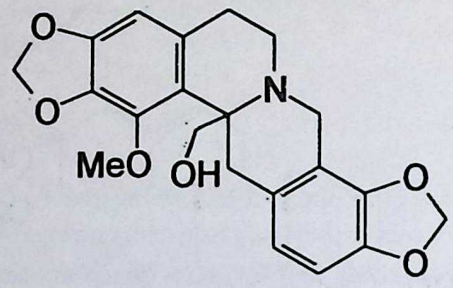

Zijinlongine

DICHROCEPHALA (Asteraceae)

D. bicolor (Roth) Schlecht; see *D. integrifolia* (L.f.) Kuntze

D. integrifolia (L.f) Kuntze syn. *D. latifolia* DC., *D. bicolor* (Roth) Schlecht (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 95).

Three isomeric caffeic acid esters - 3,4-dicaffeoyl-, 3,5-dicaffeoyl- and 4,5-dicaffeoyl-quinic acids - along with kaempferol-3-O-rutinoside and quercetin-3-O-rutinoside isolated from leaves (*Planta Med.* 1993, *59,* 288).

D. latifolia DC.; see *D. integrifolia* (L.f.) Kuntze

DICLIPTERA (Acanthaceae)

D. roxburghiana Nees syn. *Peristrophe japonica* (Thunb.) Bremk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 269).

3,5-Pyridinedicarboxamide, lupeol and allantoin, stigmasterol and β-sitosterol along with their respective glucosides isolated from aerial parts (*J. Chin. Chem. Soc.* 1992, *39,* 351; *Chem. Abstr.* 1992, *117,* 167730 j).

DICOMA (Asteraceae)

D. tomentosa Cass. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 245).

Two new sesquiterpene lactones - 15-acetoxy-14-hydroxycostunolide and dicotomentolide - along with five germacranolides (I-V) isolated from aerial parts and their structures determined (*Phytochemistry* 1990, *29,* 183).

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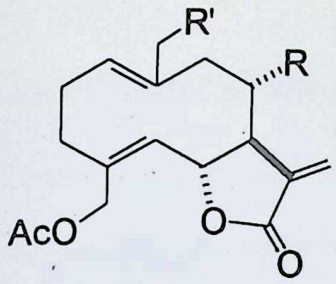

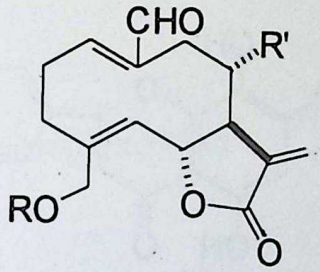

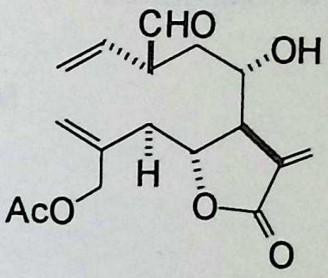

15-Acetoxy-14-hydroxycostunolide
R = H, R' = OH
I
R = H, R' = OAc
II
R = OH, R' = OAc

III
R = H, R' = OH
IV
R = Ac, R' = OH
V
R = Ac, R' = H

Dicotomentolide

DICRANOSTIGMA (Papaveraceae)

D. lactucoides Hook.f. & Thoms. syn. *Tylophorum lactucoides* (Hook.f. & Thoms.) Benth. & Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 269).

Isolation of chelerythrine, sanguinarine and chelirubine from roots (*Fitoterapia* 1992, *63,* 67).

DICTAMNUS (Rutaceae)

D. albus L. syn. *D. hispanicus* Webb (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 269).

A new glycoside - luteolin-3',4'-dimethyl ether-7-O-β-D-methylglucuronide - isolated from leaves and characterised; in addition, luteolin-7,3'-dimethyl ether and luteolin-3'-methyl ether isolated (*J. Nat. Prod.* 1989, *52,* 1311); isolation of dihydroquercetin-7,3'-dimethyl ether, quercetagetin-3,6-dimethyl ether and kaempferol-3,5,7-trimethyl ether from leaves (*Planta Med.* 1989, *55,* 402).

D. hispanicus Webb ; see *D. albus* L.

DIDYMOCARPUS (Gesneriaceae)

D. pedicellatus R.Br. (*pedicellata*) (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 246).

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Immature leaves afforded a new flavone - pediflavone - whose structure determined (*Phytochemistry* 1992, *31*, 1833).

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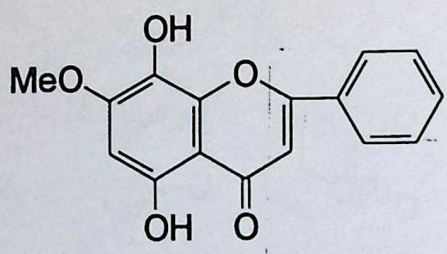

Pediflavone

DIGERA (Amaranthaceae)

D. arvensis Forsk.; see *D. muricata* (L.) Mart.

D. muricata (L.) Mart. syn. *D. arvensis* Forsk. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 247).

Palmitic acid (78.6% of total fatty acids) determined in leaves (*Pakistan J. Sci. Ind. Res.* 1989, *32*, 726; *Chem. Abstr.* 1991, *114*, 3392 n).

DIGITALIS (Scrophulariaceae)

D. lanata Ehrh. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 270).

A method developed for separation of lanatosides a, b and c (Pol. 1,41,646 (1987) Dec. 31; *Chem. Abstr.* 1990, *112*, 125180 w); a process for isolation of digoxin from leaves (*Indian Drugs* 1991, *28*, 304).

BIOLOGICAL ACTIVITY

Effect of digoxin (at 1/10 or 1/2 LD50) in rats and mice on time of onset of cramps stimulated by electroshock or carbazole, duration of tonic and clonic phases, as well as number of deceased animals were evaluated. Anticonvulsant activity of digoxin is due to its influence on membrane Na^+, K^+–ATPase and K^+–concentration (*Farmakol. Toksikol.* 1991, *54*, 11; *Chem. Abstr.* 1991, *115*, 198071 h).

D. purpurea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 271).

Seed lipids exhibited anti-influenza activity *in vitro* and *in vivo* (*Khim. Farm. Zh.* 1990, *24*, 57; *Chem. Abstr.* 1990, *113*, 217931 r); flavonoid-saponoside complex from seeds (FSC) (5.0 & 10.0 mg/kg) administered to laboratory animals exhibited immunostimulant effects (*Herba Pol.* 1992, *38*, 129; *Chem. Abstr.* 1993, *119*, 487 q).

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ced lipids composed of triglycerides (79.9), diglycerides (5.8), sterols (4.8), hydrocarbons (4.2), sterol esters (1.1) and free fatty acids (0.2%); β-sitosterol, cholesterol, campesterol and stigmasterol also isolated (*Khim. Farm. Zh.* 1990, *24*, 57; *Chem. Abstr.* 1990, *113*, 217931 r).

DIMOCARPUS (Sapindaceae)

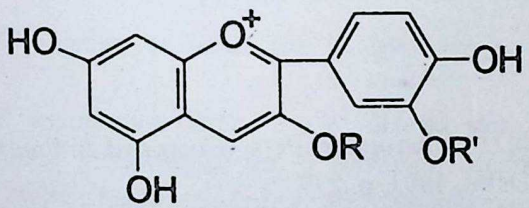
D. longan Lour.; see *Euphoria longan* (Lour.) Steud.

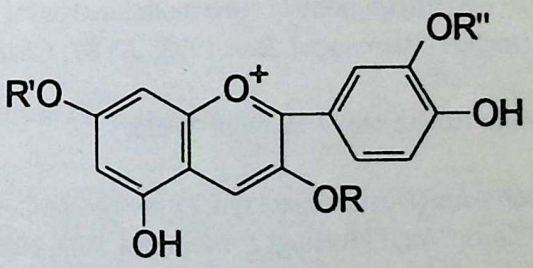
DIOSCOREA (Dioscoreaceae)

D. alata L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 251).

Two new anthocyanins - alatanins 1 and 2 - isolated from tubers of plant grown in Sri Lanka and their structures determined (*Phytochemistry* 1990, *29*, 2999); three new anthocyanins - alatanins A, B and C - from tubers and their characterisation (*Tetrahedron Lett.* 1991, *32*, 5575).

NEW COMPOUNDS





Alatanin 1
R = Gentiobiose(4"-O-sinapoyl), R' = H
Alatanin 2
R = Gentiobiose(4"-O-sinapoyl), R' = Me

Alatanin A
R = X-(3→1)Glu, R' = Glu(6-O-(E) sinapoyl), R" = Glu
Alatanin B
R = X, R' = Glu(6-O(E)sinapoyl), R" = Glu
Alatanin C
R = X, R',R" = H

X = Glu(6→1)Glu(6-O-(E)sinapoyl)

DIOSPYROS (Ebenaceae)

D. cordifolia Roxb.; see *D. montana* Roxb. var. *cordifolia* (Roxb.) Hiern

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D. discolor Willd. syn. *D. mabola* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 273).

A new sterol isolated from stem bark and characterised as stigmasta-5,6-dihydro-22-en-3β-ol; betulinic acid also isolated (*J. Indian Chem. Soc.* 1991, *68,* 477); isolation of a new tannin from stem bark and its characterisation as 3,3'-di-O-methylellagic acid-4-O-α-L-rhamnopyranosyl(1→4)-β-D-glucopyranoside (*Proc. Natl. Acad. Sci. India* 1992, *62*A, 167; *Chem. Abstr.* 1993, *119,* 156228 s).

D. embryopteris Pers.; see *D. malabarica* (Desr.) Kostel

D. kaki L.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 274).

BIOLOGICAL ACTIVITY

Condensed tannins from fruits effectively inhibited 2-nitrofluorene mutagen (Jpn. 3,77,823 (1991) Apr. 03; *Chem. Abstr.* 1991, *115,* 142242 x).

D. lotus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 274).

BIOLOGICAL ACTIVITY

7-Methyljuglone *in vitro* modulated basal tone of guinea pig trachea and precontracted rabbit trachea (*Pharmacol. Res.* 1993, *27,* 87; *Chem. Abstr.* 1993, *119,* 20250 k).

D. mabola Roxb.; see *D. discolor* Willd.

D. malabarica (Desr.) Kostel syn. *D. peregrina* Gurke, *D. embryopteris* Pers. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 277).

A new lupane-type triterpene - peregrinol - isolated from dried leaves and fruits and its structure determined (*Pharmazie* 1992, *47,* 559; *Chem. Abstr.* 1994, *120,* 73391 j; *Phytochemistry* 1994, *35,* 1070).

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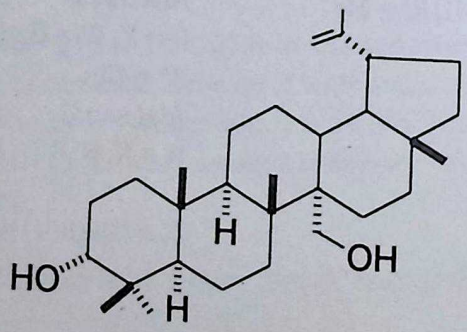

Peregrinol

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D. montana Roxb. var. *cordifolia* (Roxb.)Hiern syn. *D. cordifolia* Roxb. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 279).

Isolation of hentriacontane, hentriacontanol, α-amyrin, lupeol, ursolic acid, taraxerol and β-sitosterol (*Indian J. Pharm. Sci.* 1989, *51,* 258); a naphthoquinone carboxylate - yerrinquinone - isolated from fungal-infected stems of plant and its structure established (*Phytochemistry* 1990, *29,* 2355); isolation of ursolic acid from hydrolysed saponin fraction of leaves (*Indian Drugs* 1991, *28,* 432).

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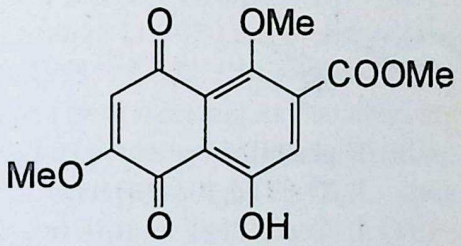

Yerrinquinone

D. peregrina Gurke; see *D. malabarica* (Desr.) Kostel

DIPLAZIUM (Athyriaceae)

D. decussatum Bedd.; see *Lunathyrium japonicum* (Thunb.) Kurata

D. esculentum (Retz.) Sw. ex Schrad. syn. *Anisogonium esculentum* (Retz.) Presl (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 255).

Isolation of protocatechuic and syringic acids (*Indian J. Plant Physiol.* 1992, *35,* 275; *Chem. Abstr.* 1993, *119,* 113341 f).

D. japonicum (Thunb.) Bedd.; see *Lunathyrium japonicum* (Thunb.) Kurata

DIPLOCLISIA (Menispermaceae)

D. glaucescens (Bl.) Diels syn. *Cocculus macrocarpus* Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 275).

A new bidesmosidic saponin - diploclisin - isolated from mature stem and characterised (*Phytochemistry* 1989, *28,* 2783); a new glycoside, 3-O-β-D-glucopyranosyl-phytolaccagenic acid isolated from stem; in addition, serjanic acid and phytolaccagenic acid isolated (*Planta Med.* 1990, *56,* 290); isolation of stepharine (*J. Natl. Sci. Counc. Sri Lanka* 1992, *20,* 187; *Chem. Abstr.* 1993, *119,* 156241 r); isolation of four new saponins (I, II, III and IV) from stems and their structure elucidation; vibo-quercitol also isolated (*Nat. Prod. Lett.* 1993, *2,* 249; *Chem. Abstr.* 1994, *121,* 5075 e).

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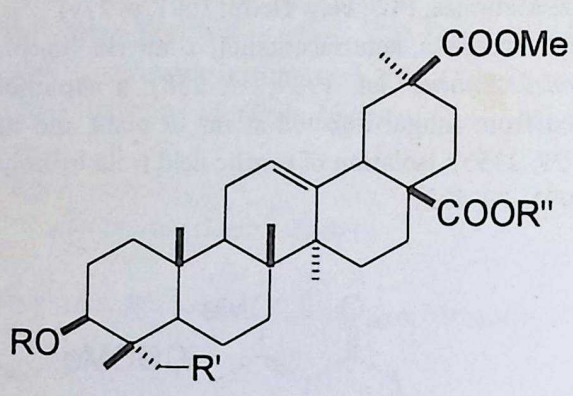

Diploclisin
R,R" = Glu, R' = OH
I
R = Gluc.acid, R',R" = H
II
R = Gluc.acid, R' = OH, R" = H
III
R = Gluc.acid. R' = OH, R" = Glu
IV
R = Gluc.acid, R' = OH, R" = Glu

DIPLOKNEMA (Sapotaceae)

D. butyracea (Roxb.) Lamk.; see *Madhuca butyracea* (Roxb.) Macbride

DIPSACUS (Dipsacaceae)

D. asper Wall. ex DC.

An acylated triterpene glycoside isolated and characterised as 4'-O-acetate of akebia saponin D; in addition, akebia saponin D, sweroside, loganin and cantleyoside isolated (*Phytochemistry* 1990, *29,* 338); two new triterpenoid saponins isolated from roots and their structures established as 3-O-(4-O-acetyl)-α-L-arabinopyranosyl-hederagenin-28-O-β-D-glucopyranosyl(1→6)-β-D-glucopyranoside and 3-O-α-L-arabinopyranosyl-oleanolic acid-28-O-β-D-glucopyranosyl(1→6)-β-D-glucopyranoside; in addition, sucrose, daucosterol, β-sitosterol and akebia saponin D isolated (*Yaoxue Xuebao* 1991, *26,* 676; *Chem. Abstr.* 1992, *116,* 170117 z); roots further afforded two more new triterpenoid glycosides characterised as 3-O-β-D-glucopyranosyl(1→3)-α-L-rhamnosyl(1→2)-α-L-arabinopyranosyl-hederagenin-28-O-β-D-glucopyranosyl(1→6)-β-D-glucopyranosyl ester and 3-O-α-L-rhamnopyranosyl(1→3)-β-D-

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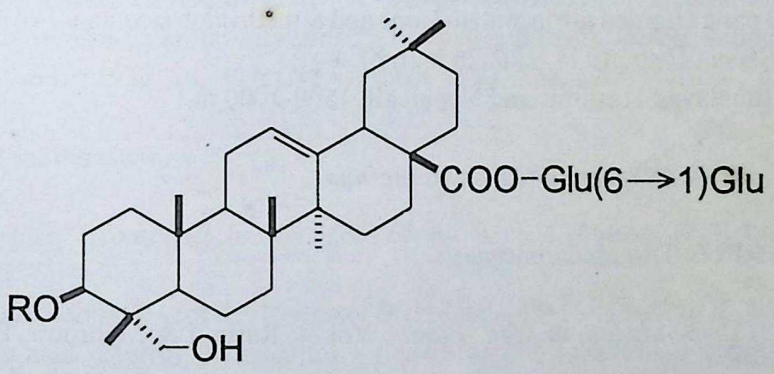
glucopyranosyl(1→3)-α-L-rhamnopyranosyl(1→2)-α-L-arabinopyranosyl-hederagenin-28-O-β-glucopyranosyl(1→6)-β-D-glucopyranosyl ester (*Yaoxue Xuebao* 1991, *26,* 911; *Chem. Abstr.* 1992, *117,* 44545 v); two new glycosides - saponins IX and X - from roots and their structure elucidation (*Yaoxue Xuebao* 1992, *27,* 912; *Chem. Abstr.* 1993, *118,* 120975 y); three more new glycosides - saponins XI, XII and XIII - isolated from roots and characterised as 3-O-[β-D-glucopyranosyl(1→4)][α-L-rhamnopyranosyl(1→3)]-β-D-glucopyranosyl(1→3)-α-L-rhamnopyranosyl(1→2)-α-arabinopyranosyl-hederagenin, its 28-O-β-D-glucopyranosyl(1→6)-β-D-glucopyranosyl ester and 3-O-[β-D-xylopyranosyl(1→4)-β-D-glucopyranosyl(1→4)]-[α-L-rhamnopyranosyl(1→3)]-β-D-glucopyranosyl(1→3)-α-L-rhamnopyranosyl(1→2)-α-arabinopyranosyl-oleanolic acid-28-O-β-D-glucopyranosyl(1→6)-β-D-glucopyranosyl ester respectively (*Yaoxue Xuebao* 1993, *28,* 358; *Chem. Abstr.* 1993, *119,* 177572 q); another new glycoside - dipsacus saponin A - from roots and its characterisation as hederagenin-28-O-β-D-glucopyranosyl(1→6)-β-D-glucopyranosyl ester; in addition, hederagenin, its 3-O-α-L-arabinopyranoside and 3-O-α-L-arabinopyranosyl-28-O-β-D-glucopyranosyl ester isolated (*Arch. Pharmacal Res.* 1993, *16,* 32; *Chem. Abstr.* 1993, *119,* 221642 p); isolation of two new glycosides - dipsacus saponins B and C - from roots and their structure elucidation (*J. Nat. Prod.* 1993, *56,* 1912).

Distribution: Meghalaya, alt. 800-1600 m.

NEW COMPOUNDS



Akebia saponin D
R = Ara
Akebia saponin D-4'-O-acetate
R = Ara(4'-Ac)
Dipsacus saponin A
R = H

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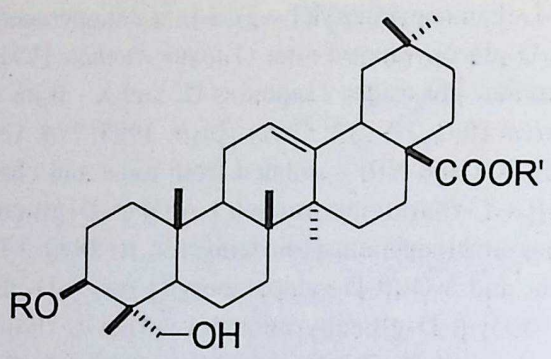


Dipsacus saponin B
R = Ara(2→1)Rha(3→1)Glu[(6→1)Rha](4→1)Glu, R' = H
Dipsacus saponin C
R = Ara(2→1)Rha(4→1)Rha(3→1)Glu(4→1)Glu(4→1)Xyl, R' = H
Saponin IX
R = Ara(2→1)Rha(3→1)Glu[(3→1)Rha](4→1)Glu(4→1)Xyl, R' = H
Saponin X
R = Ara(2→1)Rha(3→1)Glu[(3→1)Rha](4→1)Glu(4→1)Xyl,
R' = Gentiobiose

D. inermis Wall. var. *inermis* syn. *D. strictus* D.Don

Aerial parts afforded n-triacontan-3-one and 8-methyldotriacontan-7-ol (*Orient. J. Chem.* 1993, *9*, 167; *Chem. Abstr.* 1994, *120*, 265826 b).

Distribution: Himalayas, Kashmir and Nepal, alt. 1500-2000 m.

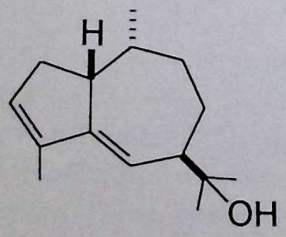
D. strictus D.Don; see *D. inermis* Wall. var. *inermis*

DIPTEROCARPUS (Dipterocarpaceae)

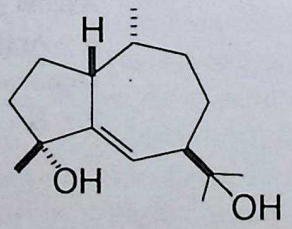
D. kerri King (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 275).

Isolation of a sesquiterpene (I) and γ-gurjunene from resin and their synthesis (*J. Chem. Ecol.* 1991, *17*, 663; *Chem. Abstr.* 1991, *115*, 92630 z).

NEW COMPOUNDS



I



γ-Gurjunene

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BIOLOGICAL ACTIVITY

Sesquiterpene I and γ-gurjunene exhibited antitermite activity (*J. Chem. Ecol.* 1991, *17,* 663; *Chem. Abstr.* 1991, *115,* 92630 z).

D. macrocarpus Vesque; see *D. retusus* Blume

D. retusus Blume syn. *D. macrocarpus* Vesque

Eng. - Hollong gurjan tree; Assam - Hollong.

Oleoresin essential oil showed antibacterial activity (*Yunnan Zhiwu Yanjiu* 1992, *14,* 337; *Chem. Abstr.* 1993, *118,* 120930 e).

Allo-aromadendrene and α-humulene identified in oleoresin essential oil of plant from Yunnan (*Yunnan Zhiwu Yanjiu* 1992, *14,* 337; *Chem. Abstr.* 1993, *118,* 120930 e).
Distribution: Assam.

D. turbinatus Gaertn. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 281).

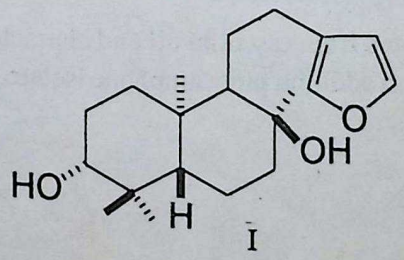
Hydroxydammarenone II, dammarenediol II, betulonic acid, asiatic acid, 3,23-O-isopropylidene asiatic acid and madasiatic acid isolated from oleoresin of plant from Yunnan (*Yunnan Zhiwu Yanjiu* 1991, *13,* 335; *Chem. Abstr.* 1992, *116,* 148177 x); α-cadinene, δ-elemene, α-gurjunene and γ-muurolene identified by GC-MS in oleoresin essential oil from Yunnan plant; composition of oleoresin essential oils collected in dry and rainy seasons found to be different (*Yunnan Zhiwu Yanjiu* 1992, *14,* 337; *Chem. Abstr.* 1993, *118,* 120930 e).

DODONAEA (Sapindaceae)

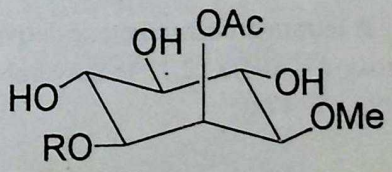
D. viscosa (L.) Jacq. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 276).

A new ent-labdane - ent-15,16-epoxy-9αH-labda-13(16),14-dien-3β,8α-diol (I) - and a new p-coumaric acid ester of myoinositol - 1-L-O-methyl-2-acetyl-3-p-coumarylmyoinositol (II) - isolated from aerial parts of Mexican plant and their structures elucidated (*J. Nat. Prod.* 1991, *54,* 913); flowers afforded penduletin, quercetin, isorhamnetin and doviscogenin (*Fitoterapia* 1992, *63,* 83); 4-hydroxy-3,5-diprenylbenzaldehyde, clemiscosins A and C, fraxetin, stearic acid and syringic acid, β-sitosterol and its glucoside isolated from stems (*J. Indian Chem. Soc.* 1994, *71,* 213).

NEW COMPOUNDS



I



II
R = p-Coumaroyl

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DOLICHOS (Papilionaceae)

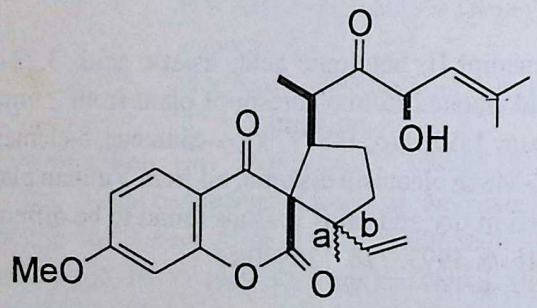
D. lablab L.; see *Lablab purpureus* (L.) Sweet

DOREMA (Apiaceae)

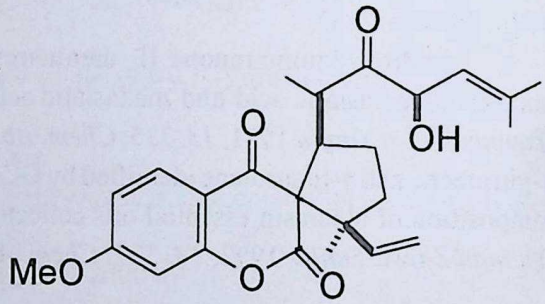
D. ammoniacum D.Don (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 101).

Ammodoremin isolated from plant resin and found to be epimeric mixture of prenylated chromandiones I and II; chromandiones separated as their acetates and structures elucidated by X-ray studies (*Helv. Chim. Acta* 1991, *74,* 495); another new prenylated chromandione - doremone A - from gum resin and its structure determination by 2D-NMR (*Gazz. Chim. Ital.* 1991, *121,* 383; *Chem. Abstr.* 1992, *116,* 3583 s).

NEW COMPOUNDS



Chromandione I
a = β, b = α
Chromandione II
a = α, b = β



Doremone A

BIOLOGICAL ACTIVITY

Chromandione II exhibited haemorrhagic activity *in vivo* (*Helv. Chim. Acta* 1991, *74,* 495).

DRACOCEPHALUM (Lamiaceae)

D. nutans L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 277).

A tetrahydrobergamotene derivative (I) isolated from essential oil and characterised as 3β-hydroxy-2-oxo-1,2,12,13-tetrahydrobergamotene; in addition pinocamphone isolated (*Planta Med.* 1992, *58,* 478).

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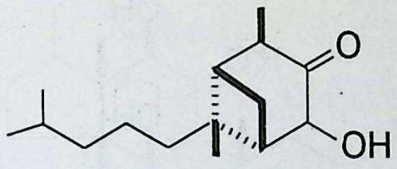


I

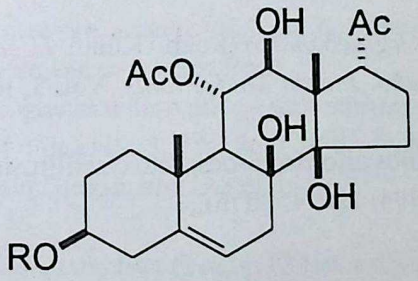
DREGIA (Asclepiadaceae)

D. lanceolata (Cooke) Sant. & Wagh syn. *D. volubilis* (L.f.) Benth. ex Hook.f. var. *angustifolia* Hook.f.

Two new pregnane ester glycosides - drelin and ceolin - isolated from roots and characterised (*J. Nat. Prod.* 1990, *53,* 1399); another new pregnane ester tetraglycoside - dregealin - along with its genin - dregenin - isolated from dried roots and their structures determined (*Phytochemistry* 1990, *29,* 2961); three new pregnane glycosides - lanceolin, lancin and lancinin - and a new genin - lanceogenin - isolated from dried roots and their structures established (*Indian J. Chem.* 1991, *30*B, 265).

Distribution: Western peninsular India.

NEW COMPOUNDS



Drelin
R = Cymarose(4→1)Cymarose(4→1)Boivinose
Ceolin
R = Oleandrose(4→1)Allose(3-O-Me-6-deoxy)(4→1)Cymarose
Dregealin
R = Oleandrose(4→1)Cymarose(4→1)Diginose(4→1)Diginose

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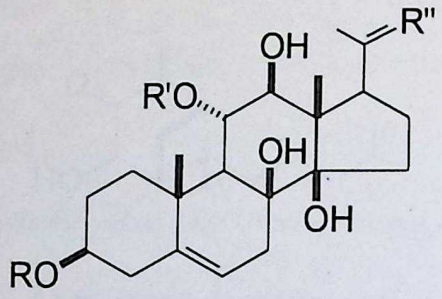

Lanceolin
R = Oleandrose(4→1)Cymarose(4→1)Diginose(4→1)Diginose
R' = Ac, R" = OH,H
Lancin
R = Cymarose(4→1)Cymarose, R' = H, R" = OH,H
Lancinin
R = Oleandrose(4→1)Cymarose, R' = H, R" = O
Lanceogenin
R = H, R' = Ac, R" = OH,H

D. volubilis (L.f.) Benth. ex Hook.f. var. *angustifolia* Hook.f.; see *D. lanceolata* (Cooke) Sant. & Wagh

DRIMIA (Liliaceae)

D. indica (Roxb.) Jessop syn. *Urginea indica* (Roxb.) Kunth, *U. coromandeliana* (Roxb.) Hook.f., *U. wightiana* Hook.f. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 258).

Defatted air-dried bulbs afforded 6-desacetoxyscillirosidin (*J. Inst. Chemists,* Calcutta 1992, *64,* 35; *Chem. Abstr.* 1994, *120,* 4590 m).

DROSERA (Droseraceae)

D. lunata Buch.-Ham.; see *D. peltata* Smith var. *lunata* (Buch.-Ham.) Clarke

D. peltata Smith; see *D. peltata* Smith var. *lunata* (Buch.-Ham.) Clarke

D. peltata Smith var. *lunata* (Buch.-Ham.) Clarke syn. *D. peltata* Smith, *D. lunata* Buch.-Ham. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 102).

A new indanone - peltatone A - isolated from whole plant and its structure determined (*Yunnan Zhiwu Yanjiu* 1991, *13,* 334; *Chem. Abstr.* 1992, *116,* 170110 s).

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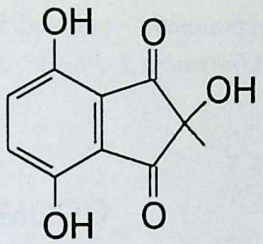
NEW COMPOUNDS



Peltatone A

DRYNARIA (Polypodiaceae)

D. parishii (Bedd.) Bedd.; see *D. propinqua* (Wall. ex Mett.) J. Sm.

D. propinqua (Wall. ex Mett.) J.Sm. syn. *D. parishii* (Bedd.) Bedd., *Pleopeltis parishii* Bedd.

A new flavanol glycoside - propinqualin [(–)epiafzelechin-3-O-β-D-alloside)] - and (E)4-O-β-D-glucosyl caffeic acid isolated from rhizomes (*Zhongguo Zhongyao Zazhi* 1992, *17,* 737; *Chem. Abstr.* 1993, *118,* 230147 n; *Phytochemistry* 1994, *35,* 1595).
Distribution: Himalayas, from Garhwal to Sikkim and Meghalaya.

DRYOPTERIS (Dryopteridaceae)

D. pulvinulifera (Bedd.) O.Kuntze syn. *Lastrea pulvinulifera* Bedd.; *L. pulvinulifera* Bedd. var. *zeylanica* Bedd., *L. sparsa* Moore var. *zeylanica* Bedd.

A new two-ring phloroglucinol derivative - pulvinuliferin VV (33VV) isolated and its structure determined (*Ann. Bot. Fenn.* 1993, *30,* 285; *Chem. Abstr.* 1994, *121,* 200856 n).
Distribution: North-eastern India, Sikkim and Darjeeling.

D. punctata C.Chr.; see *Hypolepis punctata* (Thunb.) Mett. ex Kuhn

D. subtriangularis (Hope) C.Chr. syn. *Lastrea filix-max* Presl var. *subtriangularis* (Hope) Bedd.

Two new phloroglucinol derivatives - albaspidin-iBiB (10-iBiB) and subtriangularin iB (34-iB) - isolated and their structures elucidated by NMR and high resolution mass spectrometry (*Ann. Bot. Fenn.* 1993, *30,* 285; *Chem. Abstr.* 1994, *121,* 200856 n).
Distribution: Assam and Meghalaya.

DURANTA (Verbenaceae)

D. plumieri Jacq.; see *D. repens* L.

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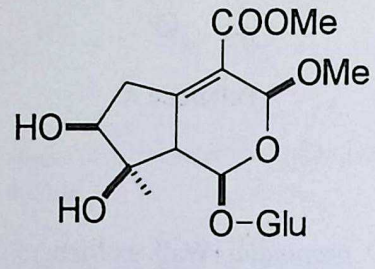
D. repens L. syn. *D. plumieri* Jacq. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 259).

A new iridoid glucoside - repenoside - isolated from fruits along with durantosides I and II and its structure determined (*Mansoura J. Pharm. Sci.* 1992, *8,* 212; *Chem. Abstr.* 1993, *118,* 230143 m).

NEW COMPOUNDS



Repenoside

DYERA (Apocynaceae)

D. costulata Hook.f. syn. *D. laxiflora* Hook.f. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 259).

Oral and i.p. administration of butanol extract of jelutong (J-4), the natural resin of plant, inhibited homologous passive cutaneous anaphylaxis (PCA) mediated by IgE antibody in guinea pigs. Thus, constituents of chewing gum have antiallergenic effects (*Shokuhin Eiseigaku Zasshi* 1992, *33,* 569; *Chem. Abstr.* 1993, *119,* 7669 j).

D. laxiflora Hook.f.; see *D. costulata* Hook.f.

DYSOPHYLLA (Lamiaceae)

D. auricularia (L.) Blume; see *Pogostemon auricularis* (L.) Hassk.

ECDYSANTHERA (Apocynaceae)

E. rosea Hook. & Arn.

A new pentacyclic triterpene (I) isolated from aerial parts, characterised as D-friedours-14-en-11α,12α-epoxy-3β-yl palmitate and partially synthesised (*J. Chin. Chem. Soc.* 1990, *37,* 187; *Chem. Abstr.* 1990, *113,* 129329 v).

Distribution: Arunachal Pradesh.

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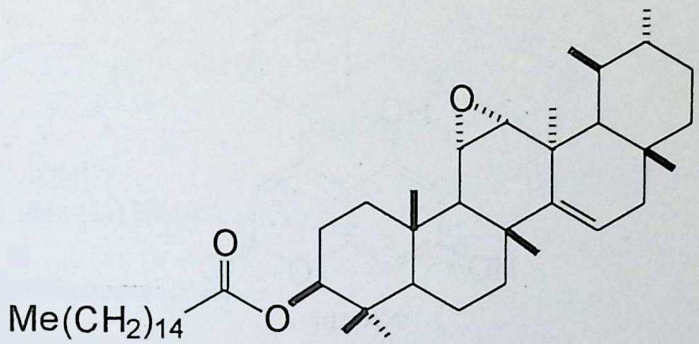

I

ECHINOPS (Asteraceae)

E. echinatus Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 279).

Taraxasterol, its acetate, lupeol, β-amyrin, β-sitosterol, its glucoside, apigenin and its 7-O-glucoside isolated (*Orient. J. Chem.* 1989, *5,* 342; *Chem. Abstr.* 1990, *112,* 115799 r; *Orient. J. Chem.* 1993, *9,* 149; *Chem. Abstr.* 1994, *120,* 240131 h); a new alkaloid - 7-hydroxyechinozolinone - isolated from flowers and its structure elucidated (*J. Nat. Prod.* 1992, *55,* 249); isolation of echinacin and echinatin (*Orient. J. Chem.* 1993, *9,* 149; *Chem. Abstr.* 1994, *120,* 240131 h).

BIOLOGICAL ACTIVITY

Echinacin and apigenin exhibited antifungal activity against *Alternaria tenuissima* (*Orient. J. Chem.* 1993, *9,* 149; *Chem. Abstr.* 1994, *120,* 240131 h).

E. niveus Wall. ex DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 280).

Isolation of 3-methyltriacontane from leaves along with echinopsine, echinopsidine, lupenone, tritriacontanol, tetratriacontanol, sitosterol, triacontanoic acid and dotriacontanoic acid (*Phytochemistry* 1990, *29,* 2697); β-amyrin, betulinic acid, lupeol, apigenin, luteolin, taraxasterol, its acetate, β-sitosterol and its glucoside isolated (*Fitoterapia* 1990, *61,* 279); a new neoflavonoid - nivetin - isolated and its structure established (*Phytochemistry* 1990, *29,* 680).

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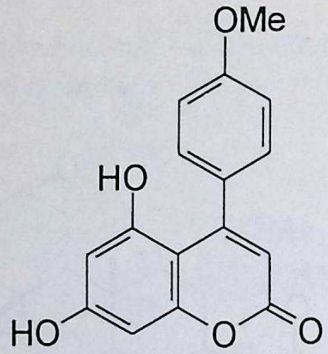


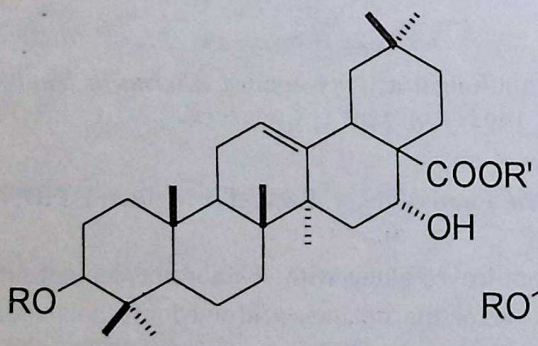
Nivetin

ECLIPTA (Asteraceae)

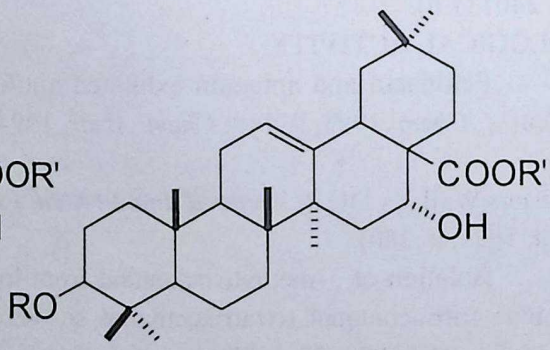
E. alba (L.) Hassk. syn. *E. erecta* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 280).

Isolation of a new terthienylaldehyde - ecliptal - and its structure elucidation (*Indian J. Chem.* 1991, *30*B, 1052); a new dithienylacetylene ester (I) isolated from roots and its structure established (*Phytochemistry* 1992, *31,* 2883); whole plant afforded stigmasterol and wedelolactone (*Zhongcaoyao* 1993, *24,* 174; *Chem. Abstr.* 1993, *119,* 4526 c); six new oleanane glycosides - eclalbasaponins I, II, III, IV, V and VI - isolated from whole plant and their structures determined (*Chem. Pharm. Bull.* 1994, *42,* 1336).

NEW COMPOUNDS



Eclalbasaponin I
R,R' = Glu
Eclalbasaponin II
R = Glu, R' =H
Eclalbasaponin III
R = Glu(2→1)Glu, R' = Glu



Eclalbasaponin IV
R = Glu(2→1)Glu, R' = H
Eclalbasaponin V
R = Glu(2-OSO_3H), R' = H
Eclalbasaponin VI
R = Glu(2-OSO_3H), R' = Glu

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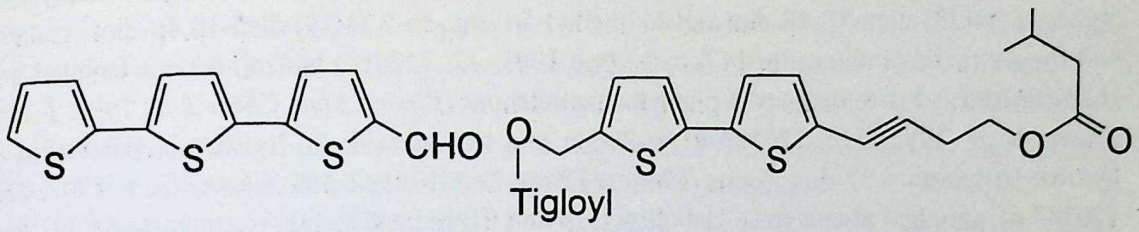


Ecliptal I

E. erecta L.; see *E. alba* (L.) Hassk.

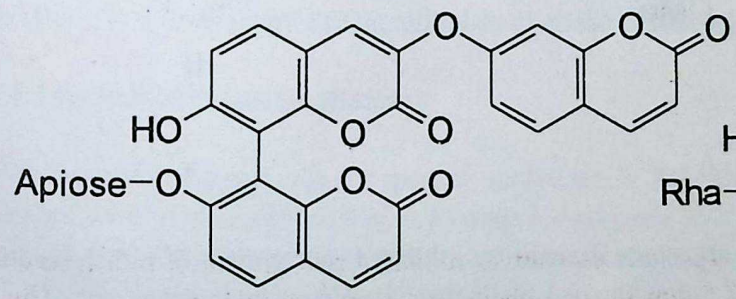
EDGEWORTHIA (Thymelaeaceae)

E. chrysantha Lindl.; see *E. gardneri* (Wall.) Meissn.

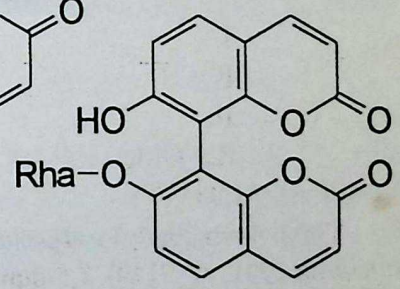
E. gardneri (Wall.) Meissn. syn. *E. tomentosa* (Thunb.) Nakai, *E. chrysantha* Lindl. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 104).

Isolation of two new coumarins - edgeworoside B and edgeworoside C - from roots and stems and their structure elucidation; rutarensin also isolated (*Phytochemistry* 1990, *29,* 247); two new potent piscicidal chrysanthosides isolated from flowers and characterised as sitosterol-3-O-6-linoleoyl-β-D-glucoside and sitosterol-3-O-6-linolenoyl-β-D-glucoside; daphnoretin and grasshopperketone also isolated (*Phytochemistry* 1991, *30,* 2927).

NEW COMPOUNDS



Edgeworoside B



Edgeworoside C

BIOLOGICAL ACTIVITY

Two chrysanthosides at 0.1 ppm concentration exhibited piscicidal activity against killie fish (*Phytochemistry* 1991, *30,* 2927).

E. tomentosa (Thunb.) Nakai; see *E. gardneri* (Wall.) Meissn.

EICHHORNIA (Pontederiaceae)

E. crassipes (Mart.) Solms (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID New Delhi, 1993, p. 261).

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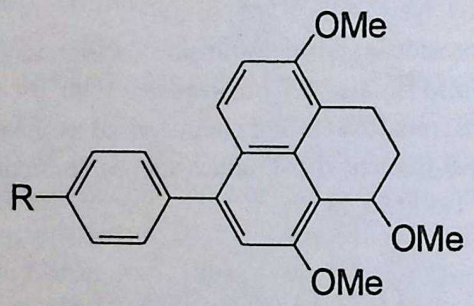
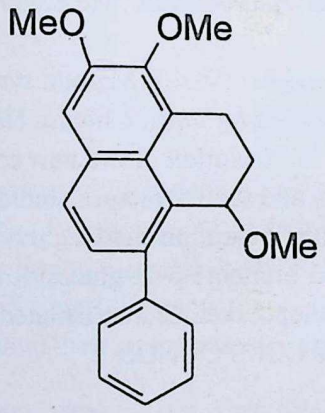
Three new sterols - 4α-methyl-5α-ergosta-8,14,24(28)-trien-3β,4β-diol, 4α-methyl-5α-ergosta-8,24(28)-dien-3β,4β-diol and 4α-methyl-5α-ergosta-7,24(28)-dien-3β,4β-diol - isolated and their structures determined (*Tetrahedron* 1991, *47,* 7129); a benzoindenone isolated and characterised as 2,5-dimethoxy-4-phenylbenzoindenone (*Bioorg. Med. Chem. Lett.* 1991, *1,* 599; *Chem. Abstr.* 1992, *116,* 170135 d); isolation of a new steroid and its characterisation as 6-hydroxystigmasta-4,22-dien-3-one (*Chinese Chem. Lett.* 1991, *2,* 509; *Chem. Abstr.* 1992, *116,* 170243 n); antialgal phenalene metabolites (I, II and III) isolated and their structures established; 2,6-dimethoxy-9-phenylphenalenone also isolated (*Bioorg. Med. Chem. Lett.* 1992, *2,* 311; *Chem. Abstr.* 1993, *119,* 113371 r); a new acylated delphinidin glycoside isolated from flowers and characterised as 6'''-O-[delphinidin-3-O-{6''-O-(β-D-glucosyl)-β-D-glucopyranosyl}]-6''-O-{apigenin-7-O-(β-D-glucopyranosyl)} malonate (*Phytochemistry* 1994, *36,* 1181).

NEW COMPOUNDS



I
R = H
II
R = OMe



III

BIOLOGICAL ACTIVITY

Three 4α-methyl-5α-ergostane derivatives inhibited root growth of radish seedlings (*Tetrahedron* 1991, *47,* 7129); 2,5-dimethoxy-4-phenylbenzoindenone inhibited growth of fungus *Candida albicans* (*Bioorg. Med. Chem. Lett.* 1991, *1,* 599; *Chem. Abstr.* 1992, *116,* 170135 d).

ELAEAGNUS (Elaeagnaceae)

E. angustifolia L. syn. *E. hortensis* M.Bieb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 281).

Oleanolic acid determined in bark during fruiting stage (0.214%) and flowering stage (0.098%) (*Zhongcaoyao* 1991, *22,* 398; *Chem. Abstr.* 1992, *116,* 102697 p).

E. hortensis M.Bieb.; see *E. angustifolia* L.

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ELAEOCARPUS (Elaeocarpaceae)

E. ganitrus Roxb. ex G.Don; see *E. sphaericus* (Gaertn.) K.Schum.

E. sphaericus (Gaertn.) K.Schum. syn. *E. ganitrus* Roxb. ex G.Don (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 282).

Elaeocarpine and isoelaeocarpine synthesised (*S. African J. Chem.* 1993, *46,* 65; *Chem. Abstr.* 1994, *120,* 323949 g).

ELEPHANTOPUS (Asteraceae)

E. scaber L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 262).

Deacylcynaropicrin, glucozaluzanin C, crepiside E and stigmasteryl-3β-glucoside isolated (*Planta Med.* 1992, *58,* 474).

ELETTARIA (Zingiberaceae)

E. cardamomum (L.) Maton syn. *Amomum compactum* Roem. & Schult. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 282).

β-Sitosterol, γ-sitosterol, phytol and mixture of n-alkanes and n-alkenes obtained from nonsaponifiable lipid fraction of green seeds (*J. Agric. Food. Chem.* 1990, *38,* 2133; *Chem. Abstr.* 1990, *113,* 229882 p); 3(R)nerolidol synthesised (*Tetrahedron Lett.* 1990, *31,* 7553).

ELEUTHEROCOCCUS (Araliaceae)

E. trifoliatus (L.) Hu syn. *Acanthopanax aculeatum* (Ait.) Seem.; *A. trifoliatus* (L.) Merr. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 282).

Navadensin, taraxerol and its acetate isolated from leaves (*Zhongguo Zhongyao Zazhi* 1992, *17,* 356; *Chem. Abstr.* 1992, *117,* 188251 u).

ELSHOLTZIA (Lamiaceae)

E. blanda (Benth.) Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 283).

Geranyl acetate (71.0), linalool (5.27), geraniol (3.77), (E)β-ocimene (2.96), β-caryophyllene (1.75), α-bergamotene (1.70), (Z)β-ocimene (1.38), acetophenone (1.13) and linalyl acetate (1.11%) determined in essential oil of plant collected from Assam (*J. Essent. Oil Res.* 1992, *4,* 121; *Chem. Abstr.* 1993, *118,* 143505 j); determination of 1,8-cineole (27.58),

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α–phellandrene (9.12%), camphene and α-pinene in essential oil from aerial parts (*Sepu* 1993, *11*, 69; *Chem. Abstr.* 1993, *119*, 135570 g).

E. ciliata (Thunb.) Hyland. syn. *E. cristata* Willd. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 283).

5-Hydroxy-6-methylflavanone-7-O-galactopyranoside, 5-hydroxy-6,7-dimethoxyflavone, 5-hydroxy-7,8-dimethoxyflavone, 5-hydroxy-7,4'-dimethoxyflavanonol and 5,7-dihydroxy-4'-methoxyflavone isolated (*Gaodeng Xuexiao Huaxue Xuebao* 1989, *10*, 866; *Chem. Abstr.* 1990, *112*, 95538 z; *Zhiwu Xuebao* 1990, *32*, 215; *Chem. Abstr.* 1990, *113*, 148917 b); isolation of 6-methyltritriacontane, 13-cyclohexylhexacosane, β-sitosterol, its glucoside and palmitic, linoleic, linolenic and ursolic acids, 5,7-dihydroxy-4'-methoxyflavone, 5-hydroxy-7,4'-dimethoxyflavone and acacetin-7-O-glucoside (*Zhiwu Xuebao* 1990, *32*, 215; *Chem. Abstr.* 1990, *113*, 148917 b); linalool, ethyl benzoate, α-carvone, limonene, α-terpinene, dihydroactinidiolide, 2-methoxy-1,3,5-trimethylbenzene, 1-octen-3-ol and aromadendrene identified in essential oil (*Zhongcaoyao* 1990, *21*, 236; *Chem. Abstr.* 1990, *113*, 148919 d); β-sitosterol, its glucoside, ursolic acid, 2α-hydroxyursolic acid, tormentic acid, negletin, apigenin and luteolin isolated (*Nippon Kagaku Kaishi* 1992, 423; *Chem. Abstr.* 1992, *117*, 55754 p); naginata ketone as main component of essential oil (*Saengyak Hakhoechi* 1992, *23*, 77; *Chem. Abstr.* 1992, *117*, 257945 n).

E. cristata Willd.; see *E. ciliata* (Thunb.) Hyland.

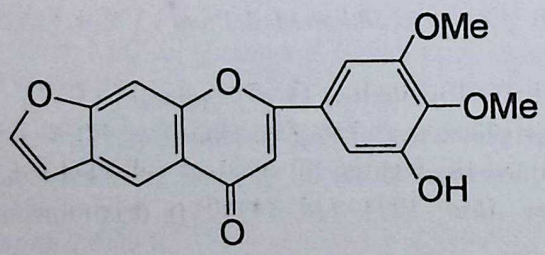
E. densa Benth.

Lahul - Mahadeni.

5,7-Dihydroxy-4'-methoxyflavone, 5-hydroxy-7,4'-dimethoxyflavanonol, kaempferol-3-O-β-D-glucoside, quercetin-3-O-β-D-glucoside, 5-hydroxy-3'-methoxyflavanone-7-O-rutinoside and 5-hydroxy-4'-methoxyflavone-7-O-rutinoside isolated (*Xibei Shifan Daxue Xuebao, Ziran Kexueban* 1991, *27*, 33; *Chem. Abstr.* 1992, *116*, 170123 y); four new compounds (I, II, III, IV) isolated and their structures elucidated (*Gaodeng Xuexiao Huaxue Xuebao* 1994, *15*, 540; *Chem. Abstr.* 1994, *121*, 276671 u); rosefuran epoxide (86.0%) determined in plant oil collected from Chamoli district, Garhwal (*J. Essent. Oil Res.* 1994, *6*, 475; *Chem. Abstr.* 1994, *121*, 308107 h).

Distribution: Himalayas from Kashmir to Kumaon, alt. 3000-3900 m.

NEW COMPOUNDS



I

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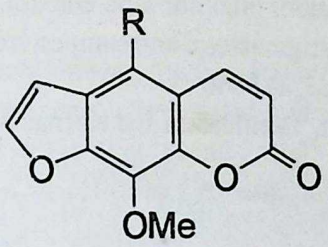

II
R = $CH_2CH_2CHMe_2$
III
R = $CH_2CH_2C(OH)Me_2$
IV
R = $CH_2CH{=}CMe_2$

E. eriostachya (Benth.) Benth. syn. *E. eriostachya* (Benth.) Benth. var. *pusilla* (Benth.) Hook.f.

Determination of geranial (53.0) and neral (39.0%) in essential oil of plant growing in Kumaon region (*J. Essent. Oil. Res.* 1992, *4*, 547; *Chem. Abstr.* 1993, *118*, 120953 q); isolation of β-sitosterol, arctigenin, 3-hydroxyarctiin, luteolin-5-O-β-D-glucoside, luteolin-7-O-β-D-glucoside, gentisic acid-5-O-β-D-glucoside, hyperoside, morin-7-O-β-D-glucoside, isosakuranetin-7-O-β-D-neohesperidoside, acacetin-7-O-β-D-rutinoside and dotriacontanoic and succinic acids from whole plant (*Zhiwu Xuebao* 1992, *34*, 705; *Chem. Abstr.* 1993, *119*, 24607 e). Distribution: Himalayas from Garhwal to Sikkim, alt. 3600-4800 m.

E. eriostachya (Benth.) Benth. var. *pusilla* (Benth.) Hook.f.; see *E. eriostachya* (Benth.) Benth.

E. fruticosa (D.Don) Rehder syn. *E. polystachya* Benth. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 283).

Porillene (61.2) and 1,8-cineole (37.3%) determined in essential oil of leaves and cones of plant from two different locations (*Planta Med.* 1992, *58*, 376).

E. polystachya Benth.; see *E. fruticosa* (D.Don) Rehder

EMBLICA (Euphorbiaceae)

E. officinalis Gaertn. syn. *Phyllanthus emblica* L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 284).

Water-soluble fraction of methanol extract of leaves showed anti-inflammatory activity in carrageenin and dextran-induced rat hind paw oedema (*J. Pharm. Pharmacol.* 1993, *45*, 581).

EMEX (Polygonaceae)

E. spinosa (L.) Campd. (*spinosus*) syn. *Rumex spinosus* L.

Rajasthan - Khato-palak.

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Chrysophanol, physcion, emodin, aloe-emodin, chrysophanin, β-sitosterol glucoside and a mixture of β-sitosterol, stigmasterol and campesterol isolated (*Egypt. J. Pharm. Sci.* 1990, *31*, 93; *Chem. Abstr.* 1990, *113*, 148860 c).

Distribution: Rajasthan, Bihar, Tamil Nadu and Karnataka.

EMILIA (Asteraceae)

E. sonchifolia DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 285).

Isolation of simiaral, β-sitosterol, stigmasterol, palmitic acid and triacontanoic acid (*Zhongguo Zhongyao Zazhi* 1993, *18*, 102; *Chem. Abstr.* 1993, *119*, 4960 m).

ENGELHARDTIA (Juglandaceae)

E. aceriflora Blume; see *E. spicata* Lechen ex Blume var. *spicata*

E. chrysolepis Hance; see *E. roxburghiana* Wall.

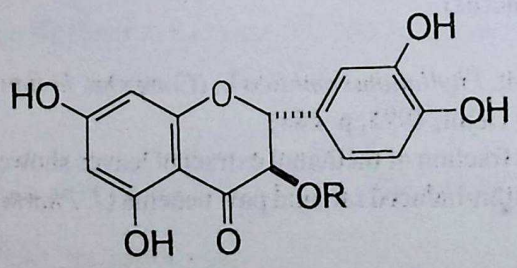
E. colebrookiana Lindl. ex Wall.; see *E. spicata* Lechen ex Blume var. *integra* (Kurz) Manning ex Steenis

E. polystachya Radlk.; see *E. roxburghiana* Wall.

E. roxburghiana Wall. syn. *E. polystachya* Radlk., *E. wallichiana* Lindl. ex C.DC., *E. chrysolepis* Hance (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 285).

A sweet dihydroflavonol glycoside - huangqioside E - isolated from leaves and characterised as 3-O-β-D-glucosyl(1→3)-α-L-rhamnopyranosyl-(2R,3R)taxifolin (*Chem. Pharm. Bull.* 1991, *39*, 1871).

NEW COMPOUNDS



Huangqioside E
R = Rha(3→1)Glu

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E. spicata Lechen ex Blume var. *integra* (Kurz) Manning ex Steenis syn. *E. colebrookiana* Lindl. ex Wall.

P. - Timarrakh; Kumaon - Gobarmowa; Assam - Pasomasi, Dieng parsomasi.

A new piscicidal quercetin glycoside (I) isolated and its structure elucidated (*Int. J. Pharmacog.* 1992, *30,* 209; *Chem. Abstr.* 1993, *118,* 143404 a).

Distribution: Foothills of Himalayas, Khasi Hills and Assam.

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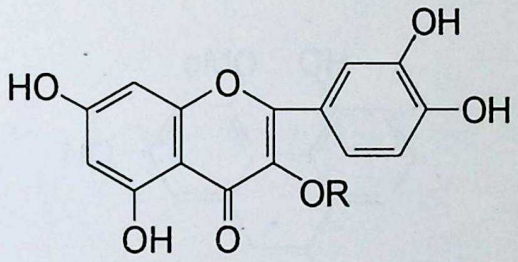

I

R = Rha(4→1)Xyl(4→1)Glu

E. spicata Lechen ex Blume var. *spicata* syn. *E. aceriflora* Blume (*acerifolia*) (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 107).

Stem bark afforded 2,6-dimethoxy-1,4-benzoquinone, β-sitosterol, its glucoside, lupeol, betulinic acid and betulin (*Indian J. Chem.* 1992, *31*B, 133).

E. wallichiana Lindl. ex C.DC.; see *E. roxburghiana* Wall.

ENTADA (Mimosaceae)

E. phaseoloides (L.) Merr.; see *E. pursaetha* DC. ssp. *pursaetha*

E. pursaetha DC. ssp. *pursaetha* syn. *E. phaseoloides* auct. [non (L.) Merr.], *E. scandens* auct. [non (L.) Benth.], p.p. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 286).

Isolation and structure determination of 2-hydroxy-5-butoxyphenylacetic acid, 2β-D-glucopyranosyloxy-5-butoxyphenylacetic acid, entamide A-β-D-glucopyranoside and 2,5-dihydroxyphenylacetic acid methyl ester from Indonesian plant (*Phytochemistry* 1991, *30,* 3749).

BIOLOGICAL ACTIVITY

2-Hydroxy-5-butoxyphenylacetic acid and 2,5-dihydroxyphenylacetic acid methyl ester were cytotoxic to cultured P-388 cells with ED50 values of 1.0 and 1.7 μg/ml respectively (*Phytochemistry* 1991, *30,* 3749).

E. scandens (L.) Benth.; see *E. pursaetha* DC. ssp. *pursaetha*

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EPIGENEIUM (Orchidaceae)

E. rotundatum (Lindl.) Summ. syn. *Dendrobium rotundatum* (Lindl.) Hook.f.

A new 9,10-dihydrophenanthrene derivative - rotundatin - isolated and characterised as 2,5,9-trihydroxy-4-methoxy-9,10-dihydrophenanthrene; 2,7-dihydroxy-3,4,6-trimethoxy-phenanthrene, its 9,10-dihydro derivative, nudol, moscatin and batatasin III also isolated (*Phytochemistry* 1992, *31*, 3225).

Distribution: Himalayas, Nepal to Bhutan, alt. 1800-2100 m and hills of Nagaland.

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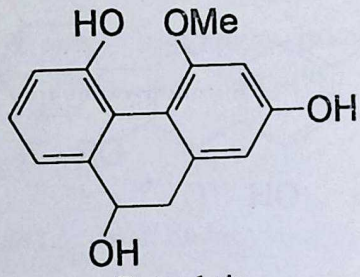

Rotundatin

EQUISETUM (Equisetaceae)

E. arvense L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 289).

Brassinolide, dolichosterone, norcastasterone and castasterone identified in brassinosteroids fraction by HPLC (*Agric. Biol. Chem.* 1990, *54*, 1057); crystal structure of protogenkwanin determined (*J. Crystallogr. Spectrosc. Res.* 1991, *21*, 183; *Chem. Abstr.* 1991, *114*, 247006 f); isolation of (E)dicaffeoylmeso-tartaric acid from barren sprouts (*Phytochemistry* 1991, *30*, 527); 5-caffeoylshikimic acid also isolated from barren sprouts (*Phytochemistry* 1992, *31*, 3483); a new styrylpyrone - equisetumpyrone - isolated from vegetative gametophyte and its structure established as 3,4-dihydroxy-6(3',4'-dihydroxy-(E)-styryl)-2-pyrone-3-O-β-D-glucopyranoside (*Phytochemistry* 1993, *32*, 1029); isolation of kaempferol (*J. Adv. Sci.* 1993, *5*, 114; *Chem. Abstr.* 1994, *121*, 132509 z).

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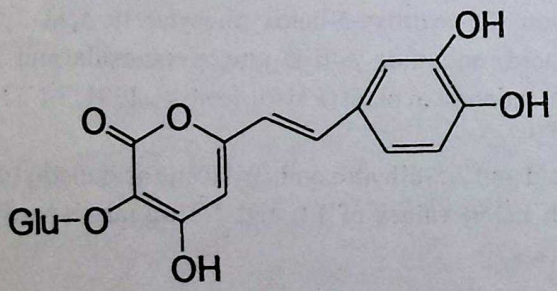
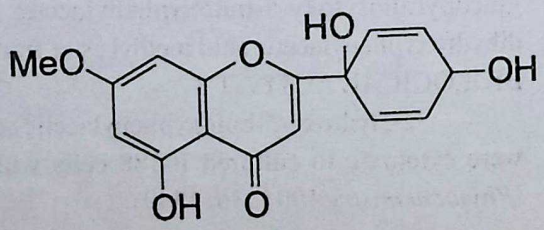


Equisetumpyrone



Protogenkwanin

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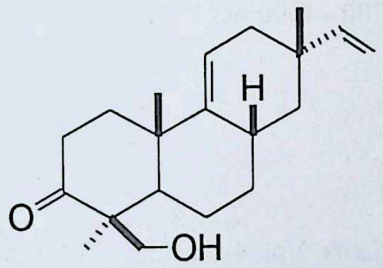
ERAGROSTIS (Poaceae)

E. ferruginea (Thunb.) Beauv.

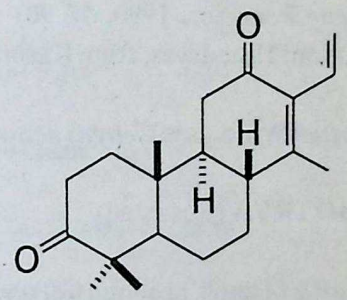
Isolation and structure elucidation of two new diterpenes - isopimara-9(11),15-dien-19-ol-3-one (I) and cassa-13(14),15-dien-3,12-dione (II) - from roots; isopimara-9(11),15-dien-3β,19-diol also isolated (*Phytochemistry* 1991, *30,* 2410).

Distribution: Nepal to Sikkim, alt. 2700 m.

NEW COMPOUNDS



I



II

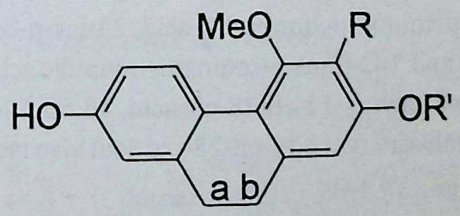
ERIA (Orchidaceae)

E. flava Lindl.; see *E. pubescens* (Hook.) Lindl. ex Steud.

E. pubescens (Hook.) Lindl. ex Steud. syn *E. flava* Lindl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 290).

Two new stilbenoids - flavanthridin and flavanthrinin - isolated and their structures elucidated; coelonin, flavanthrin and 3,7-dihydroxy-2,4-dimethoxyphenanthrene also isolated (*Phytochemistry* 1990, *29,* 3052).

NEW COMPOUNDS



Flavanthridin
R = OH, R' = Me
Flavanthrinin
R,R' = H, ab = Δ

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ERIGERON (Asteraceae)

E. alpinus Hook.f. var. *alpinus;* see *E. kumaonensis* (Vierh.) Wendelbo

E. canadensis L.; see *Conyza canadensis* (L.) Cronq.

E. kumaonensis (Vierh.) Wendelbo (*kumaunensis*) syn. *E. alpinus* Hook.f. var. *alpinus* sensu Hook.f., p.p.

Aerial parts afforded stigmasterol, α-spinasterol, dihydrospinasterol, α- and β-amyrins (*J. Indian Chem. Soc.* 1990, *67,* 90).

Distribution: Himalayas, from Kashmir to Nepal, alt. 2700 - 4500 m.

E. linifolius Willd.; see *Conyza bonariensis* (L.) Cronq.

ERIOBOTRYA (Rosaceae)

E. japonica (Thunb.) Lindl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 291).

Isolation of 6α,19α-dihydroxyursolic acid from leaves and its structure determination; in addition, ursolic acid, 2α-hydroxyursolic acid and maslinic acid isolated (*Planta Med.* 1990, *56,* 330); hexanal (2.4), (E)2-hexenal (1.8) and benzaldehyde (0.7 mg/kg) determined in Spanish fruits by GC-MS (*J. Food Sci.* 1990, *55,* 176; *Chem. Abstr.* 1990, *112,* 156982 p); four nerolidol glycosides isolated from leaves and characterised as nerolidol-3-O-α-L-rhamnosyl(1→2)-β-D-glucopyranoside (I), nerolidol-3-O-α-L-rhamnosyl(1→4)-α-L-rhamnosyl(1→2)-β-D-glucopyranoside (II), nerolidol-3-O-α-rhamnosyl(1→4)-α-L-rhamnosyl(1→6)-β-D-glucopyranoside (III) and nerolidol-3-O-[α-L-rhamnosyl(1→4)-α-L-rhamnosyl(1→2)]-α-L-rhamnosyl(1→6)-β-D-glucopyranoside (IV) (*J. Nat. Prod.* 1990, *53,* 810); two new gibberellins - GA80 (11β-hydroxy-GA7) and GA84 (11β-hydroxy-GA9) - isolated from immature seeds of plant collected from its developing fruits 90 days after full bloom; GA9, GA15, GA24, GA35 and GA50 also isolated (*Biosci., Biotechnol., Biochem.* 1992, *56,* 17; *Chem. Abstr.* 1992, *116,* 211131 v); four new triterpene esters - 23-trans-p-coumaroyltormentic acid, 23-cis-p-coumaroyltormentic acid, 3-O-trans-caffeoyltormentic acid and 3-O-trans-p-coumaroylrotundic acid - isolated and their structures elucidated; 2α,3α,19α-trihydroxyurs-12-en-28-oic acid, 3β,6β,19α-trihydroxyurs-12-en-28-oic acid and 2α,3α,19α,23-tetrahydroxyurs-12-en-28-oic acid also isolated (*J. Nat. Prod.* 1992, *55,* 1067).

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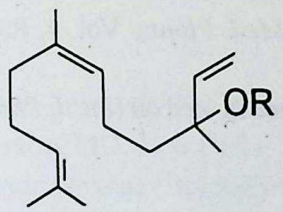

I
R = Glu(2→1)Rha
II
R = Glu(2→1)Rha(4→1)Rha
III
R = Glu(6→1)Rha(4→1)Rha
IV
R = Glu[(2→1)Rha(4→1)Rha](6→1)Rha

BIOLOGICAL ACTIVITY

Nerolidol glycosides and hydroxylated ursolic acids produced marked inhibition of glycosuria in genetically-diabetic mice (C57 BL/KS-db/db/ola) and normoglycaemic rats. Nerolidol-3-O-α-L-rhamnosyl (1→4)-α-L-rhamnosyl (1→6)-β-D-glucopyranoside, 2α, 3β-dihydroxyurs-12-en-18-oic acid and 3β, 6α, 19α-trihydroxyurs-12-en-18-oic acid markedly inhibited glycosuria, and two latter compounds also reduced blood sugar levels in normoglycaemic rats (*Planta Med.* 1991, *57,* 414); 3-O-trans-caffeoyltormentic acid was significantly active against HRVIB (human rhinovirus) infection causing 50% reduction of cytopathic effect at 20 μg/ml. Its inhibitory effect was <25% at 4 μg/ml concentration (*J. Nat. Prod.* 1992, *55,* 1067); ursolic acid showed potent anticarcinogenic activity against sarcoma 180 cells and significantly suppressed c-myc oncogene expression but lowered c-Ha-ras oncogene expression only slightly (*Han'guk Yongyang Siklyong Hakhoechi* 1992, *21,* 314; *Chem. Abstr.* 1993, *118,* 139348 t).

ERIODENDRON (Bombacaceae)

E. anfractuosum DC.; see *Ceiba pentandra* (L.) Gaertn.

ERODIUM (Geraniaceae)

E. circutarium (L.) L'Herit. ex Ait. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 268).

Determination of geraniol (16.7), citronellol (15.4), isomentone (11.2) and methyl eugenol (10.6%) in essential oil (*J. Essent. Oil Res.* 1993, *5,* 317; *Chem. Abstr.* 1993, *119,* 91298 t).

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ERUCA (Brassicaceae)

E. sativa Mill. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 292).

Thiopentanonitrile identified in seed oil (*Int. J. Pharmacog.* 1992, *30,* 135; *Chem. Abstr.* 1992, *117,* 258035 c).

ERVATAMIA (Apocynaceae)

E. coronaria Stapf; see *Tabernaemontana divaricata* (L.) R.Br. ex R. & S.

E. divaricata (L.) Alston; see *Tabernaemontana divaricata* (L.) R.Br. ex R. & S.

ERVUM (Papilionaceae)

E. lens L.; see *Lens culinaris* Medik.

ERYNGIUM (Apiaceae)

E. foetidum L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 110).

Determination of trans-2-dodecenal (45.5) and 2-dodecenoic acid (15.5%) in essential oil of aerial parts (*Tap Chi Duoc Hoc* 1991, 19; *Chem. Abstr.* 1992, *117,* 76227 j; *J. Essent. Oil Res.* 1992, *4,* 423; *Chem. Abstr.* 1993, *118,* 260663 v); 2,3,6-trimethylbenzaldehyde (37.55) and 2-formyl-1,1,5-trimethylcyclohexa-2,4-dien-6-ol (19.82%) determined in root oil and trans-2-dodecenal (59.72%) in leaf oil (*J. Essent. Oil Res.* 1994, *6,* 395; *Chem. Abstr.* 1994, *121,* 186927 c).

ERYTHRINA (Papilionaceae)

E. indica Lam.; see *E. variegata* L.

E. lithosperma (Hassk.) Merr. syn. *E. lithosperma* Miq. (non Blume ex Hassk.) (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 302).

3-Demethoxyerythratidinone synthesised (*Chem. Pharm. Bull.* 1990, *38,* 907).

E. lithosperma Miq.; see *E. lithosperma* (Hassk.) Merr.

E. suberosa Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 296).

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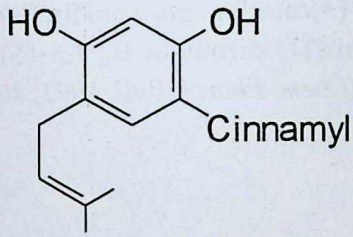
Isolation of erysodine, erysopine, erythraline, 11β-methoxyerythraline and its N-oxide, erythrinine, 8-oxoerythrinine and erythratidine from flowers (*Indian J. Pharm. Sci.* 1989, *51,* 189).

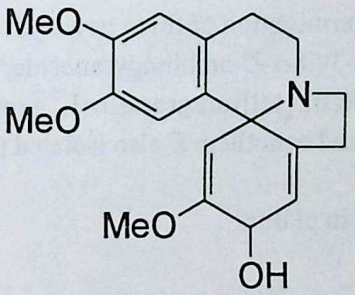
E. variegata L. syn. *E. variegata* L. var. *orientalis* (L.) Merr., *E. indica* Lam. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 296).

A new cinnamylphenol - eryvariestyrene - isolated from roots and its structure elucidated; warangalone (scandenone), 5,7,4'-trihydroxy-6,8-diprenylisoflavone, erycristagallin, erythrabyssin II, phaseollin, phaseollidin and isobavachin also isolated (*Phytochemistry* 1990, *29,* 2005); isolation of a new isoquinoline alkaloid - isococcolinine - from flowers and its structure determination (*Indian J. Heterocycl. Chem.* 1992, *2,* 71; *Chem. Abstr.* 1993, *119,* 4929 h); another isoquinoline alkaloid - erythritol - isolated from flowers and its structure determined (*Fitoterapia* 1993, *64,* 15); flowers afforded 3β-acetoxy-B-norcholest-5-ene, capric acid, docosanoic acid methyl ester, 29-norcycloartenol and β-sitosterol arachidate (*Fitoterapia* 1993, *64,* 88).

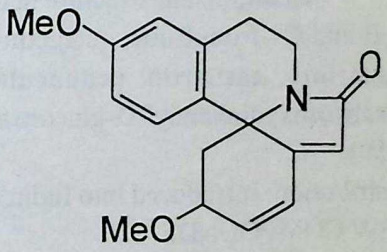
NEW COMPOUNDS



Eryvariestyrene



Erythritol



Isococcolinine

E. variegata L. var. *orientalis* (L.) Merr.; see *E. variegata* L.

ETHULIA (Asteraceae)

E. conyzoides L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 273).

Ethuliacoumarin A, isoethuliacoumarin A, isoethuliacoumarin B and 5-methyl-4-hydroxycoumarin isolated (*Indian Drugs* 1989, *27,* 129); relative and absolute configurations of ethuliacoumarin A established as 3'S, 5'R, 6'R by X-ray analysis which are reversed of previously reported configurations (*Acta Chem. Scand.* 1992, *46,* 750); a novel spiromonoterpene coumarin - spiro-ethuliacoumarin - isolated from aerial parts and its crystal structure determined (*Tetrahedron Lett.* 1994, *35,* 6517).

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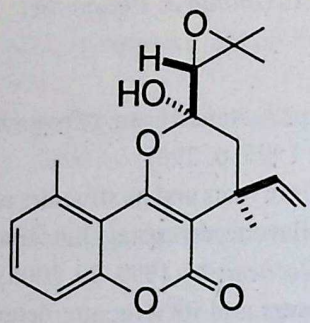
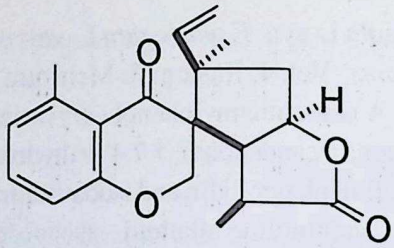


Ethuliacoumarin A



Spiro-ethuliacoumarin

EUCALYPTUS (Myrtaceae)

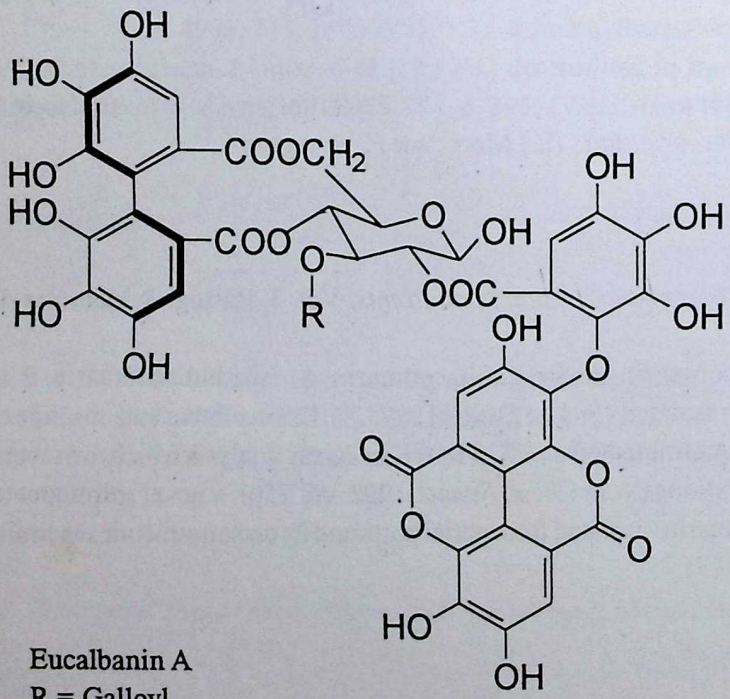
E. alba Reinw.

Eng. - Eucalyptus.

Isolation and structure determination of three new hydrolyzable tannins - eucalbanins A, B and C - from fruits; quercetin-3-O-α-L-arabinopyranoside, (+)catechin, procyanidin B-7, casuarinin, casuariin, pedunculagin, tellimagrandin I, gemin D, cornusiin B, 2,3-(S)-hexahydroxydiphenoyl-D-glucose and oenothein B also isolated (*Chem. Pharm. Bull.* 1992, *40*, 1750).

Distribution: Introduced into India, in plains.

NEW COMPOUNDS



Eucalbanin A
R = Galloyl

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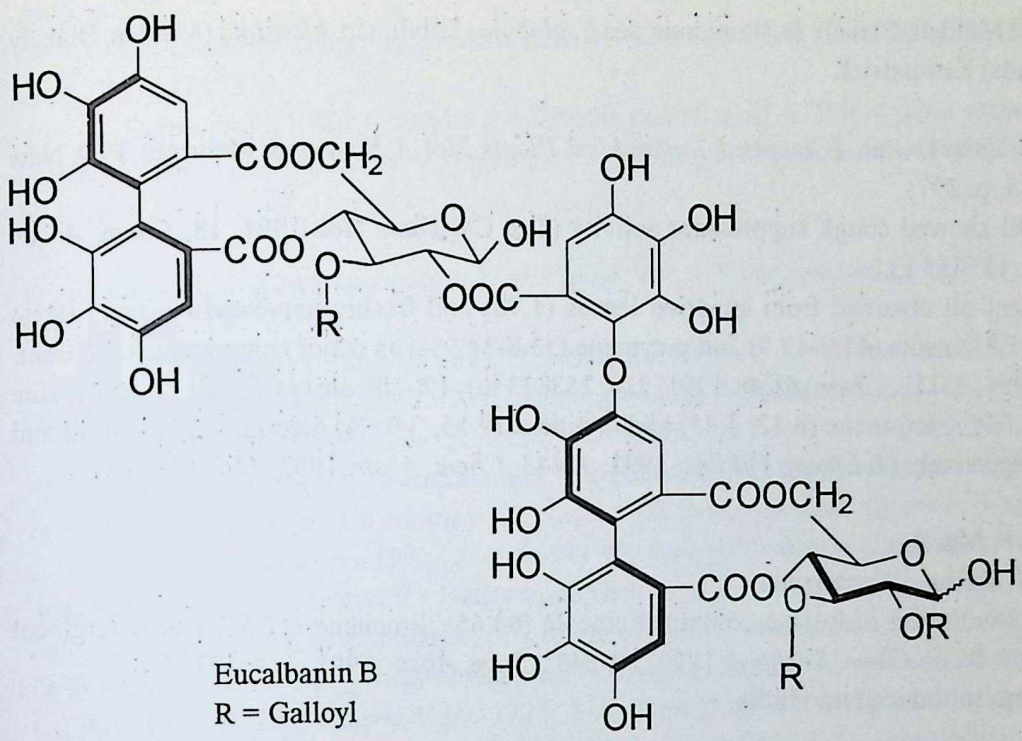
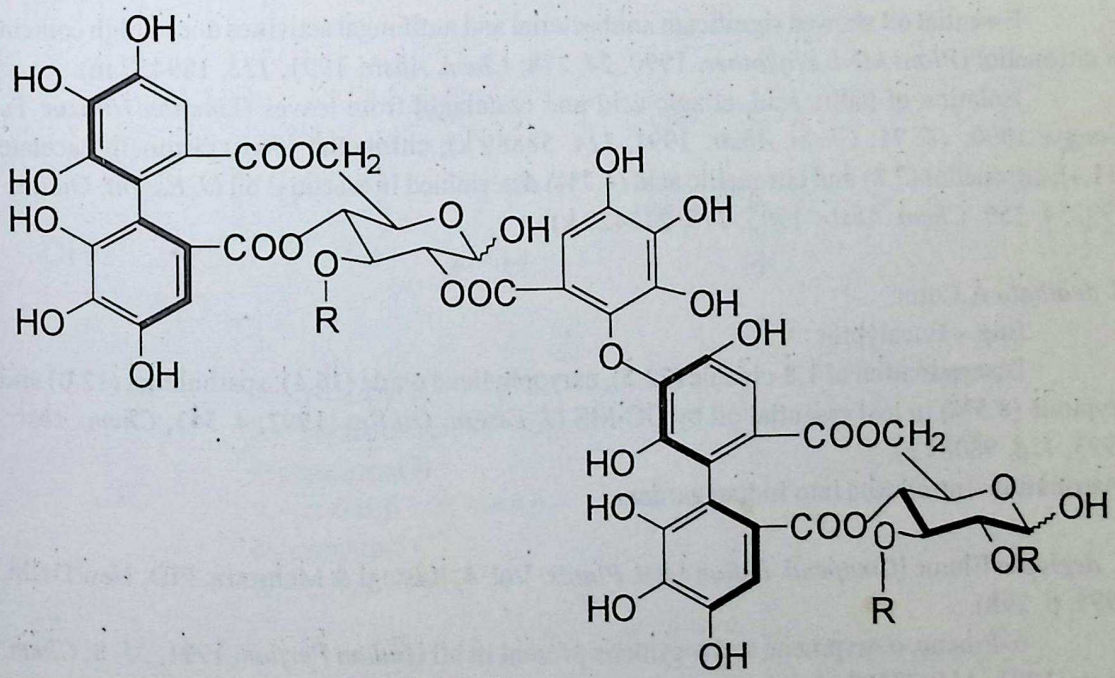


Eucalbanin B
R = Galloyl



Eucalbanin C
R = Galloyl

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E. bicostata Maiden, Blakely & Simmonds; see *E. globulus* Labill. ssp. *bicostata* (Maiden, Blakely & Simmonds) Kirkpatrick

E. camaldulensis Dehnh. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 297).

Oil showed cough suppressant activity (*Tap Chi Duoc Hoc* 1994, 18; *Chem. Abstr.* 1994, *121,* 117455 k).

Leaf oil obtained from air-dried leaves (1.70) and freshly harvested leaves (1.04%) contained 1,8-cineole (45.0-49.9) and p-cymene (33.8-34.9%) as major components (*J. Essent. Oil Res.* 1991, *3,* 117; *Chem. Abstr.* 1991, *114,* 253823 m); 1,8-cineole (44.62, 49.35), p-cymene (23.30, 19.66), γ-terpinene (8.12, 4.45) and α-pinene (9.55, 3.03%) determined in leaf oil and fruit oil respectively (*J. Essent. Oil Res.* 1991, *3,* 443; *Chem. Abstr.* 1992, *116,* 37976 n).

E. cinerea F. Muell.

H. & Eng. - Eucalyptus.

Essential oil of foliage contained cineole (64.65), limonene (12.51) and α-terpineol (11.56%) (*J. Wood Chem. Technol.* 1990, *10,* 543; *Chem. Abstr.* 1991, *114,* 49327 y).
Distribution: Introduced into India.

E. citriodora Hook. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 297).

Essential oil showed significant antibacterial and antifungal activities due to high content of citronellol (*Plant Med. Phytother.* 1990, *24,* 278; *Chem. Abstr.* 1991, *115,* 189457 m).

Isolation of gallic acid, ellagic acid and castalagin from leaves (*Linchan Huaxue Yu Gongye* 1990, *10,* 71; *Chem. Abstr.* 1991, *114,* 58889 k); citronellal (56.0) citronellyl acetate (11.4), citronellol (7.8) and citronellic acid (4.7%) determined in essential oil (*J. Essent. Oil Res.* 1992, *4,* 259; *Chem. Abstr.* 1993, *118,* 219429 k).

E. dealbata A.Cunn.

Eng. - Eucalyptus.

Determination of 1,8-cineole (22.5), caryophyllene oxide (16.4), spathulenol (12.0) and cryptone (8.5%) in leaf essential oil by GC-MS (*J. Essent. Oil Res.* 1992, *4,* 543; *Chem. Abstr.* 1993, *118,* 98081 e).
Distribution: Introduced into Indian gardens.

E. deglupta Blume (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 298).

α-Pinene, α-terpinene and p-cymene present in oil (*Indian Perfum.* 1991, *35,* 8; *Chem. Abstr.* 1991, *115,* 78598 p).

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E. exserta F.Muell. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 298).

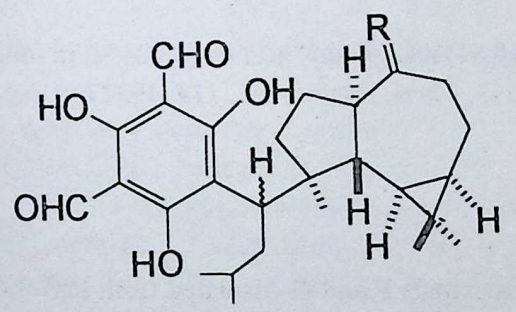
Oil exhibited cough suppressant activity (*Tap Chi Duoc Hoc* 1994, 18; *Chem. Abstr.* 1994, *121,* 117455 k).

Determination of 1,8-cineole (34.33%) in essential oil (1.2%) of plant grown in Huian, Fujian province (*Tianran Chanwu Yanjiu Yu Kaifa* 1991, 3, 79; *Chem. Abstr.* 1992, *116,* 66881 h).

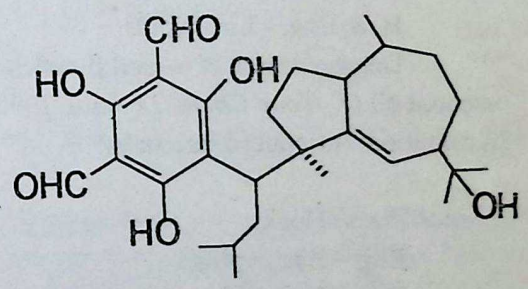
E. globulus Labill. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 298).

Alloaromadendrene (23.37), 1,8-cineole (20.81), cis-,trans-farnesols (9.95), α-phellandrene (8.30), δ-guaiene (5.95), α-pinene (4.09), β-phellandrene (3.43) and α-guaiene (3.15%) determined in fruit oil by GC-MS (*Tianran Chanwu Yanjiu Yu Kaifa* 1990, *2,* 51; *Chem. Abstr.* 1991, *114,* 253906 r); essential oil (3.5%) obtained from air-dried leaves of plant growing in Mile, Yunnan province contained 1,8-cineole (67.54%) (*Tianran Chanwu Yanjiu Yu Kaifa* 1991, *3,* 79; *Chem. Abstr.* 1992, *116,* 66881 h); five HIV-reverse transcriptase inhibitors - macrocarpals A, B, C, D and E - isolated and their crystal structures determined (*Tetrahedron Lett.* 1992, *33,* 2983); determination of 1,8-cineole (72.8), α-pinene (11.9), α-terpinyl acetate (2.7), aromadendrene (2.6), trans-pinocarveol (1.6) and globulol (1.2%) in essential oil (*J. Essent. Oil Res.* 1992, *4,* 259; *Chem. Abstr.* 1993, *118,* 219429 k); 1,8-cineole, α-pinene, limonene, aromadendrene, δ-cadinene and globulol identified in essential oil of leaves (*Flavour Fragrance J.* 1994, *9,* 51; *Chem. Abstr.* 1994, *121,* 117285 e).

NEW COMPOUNDS



Macrocarpal A
R = α-OH,β-Me, ~~ = α
Macrocarpal B
R = α-OH,β-Me, ~~ = β
Macrocarpal C
R = CH_2 , ~~ = α



Macrocarpal D

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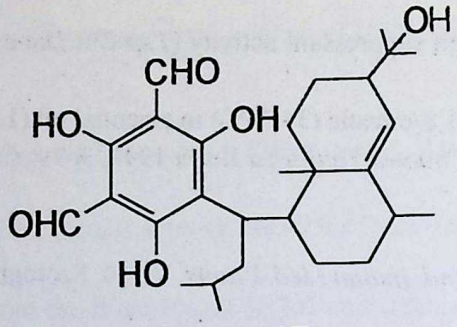


Macrocarpal E

BIOLOGICAL ACTIVITY

Antitumor-promoting activity of euglobals Ia_1, Ia_2, Ib, Ic, IIa, IIb, IIc, III, IVa, IVb, V and VIII was tested *in vitro* on 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced Epstein-Barr virus early antigen (EBV-EA) activation test system. Euglobal-III showed strong inhibitory activity, followed by euglobals Ib, IIa, Ic, Ia1 and Ia2 (*Chem. Pharm. Bull.* 1990, *38,* 2737).

E. globulus Labill. ssp. *bicostata* (Maiden, Blakely & Simmonds) Kirkpatrick syn. *E. bicostata* Maiden, Blakely & Simmonds

Eng. - Eucalyptus.

Cineole isolated (*Indian Perfum.* 1991, *35,* 8; *Chem. Abstr.* 1991, *115,* 78598 p).

Distribution: Introduced into India.

E. macarthuri Decne.& Maiden

H. & Eng. - Eucalyptus.

Determination of α- and β-eudesmols (18.91) and geranyl acetate (23.84%) in foliage essential oil (*J. Wood Chem. Technol.* 1990, *10,* 543; *Chem. Abstr.* 1991, *114,* 49327 y).

Distribution: Introduced into India.

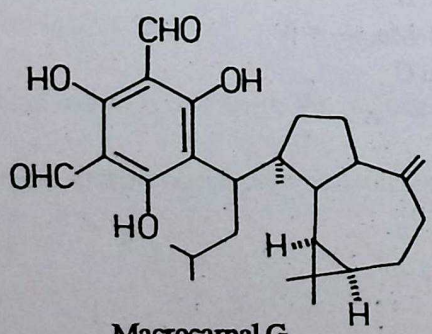
E. macrocarpa Hook.

Eng. - Eucalyptus.

Two new antibacterial diterpenes - macrocarpals F and G - isolated from leaves and their structures determined; macrocarpals B, C, D and E also isolated (*Biosci., Biotechnol., Biochem.* 1992, *56,* 1570; *Chem. Abstr.* 1993, *118,* 120923 e).

Distribution: Introduced into India in plains and hills.

NEW COMPOUNDS



Macrocarpal G

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E. macrorhyncha F.Muell.

H. & Eng. - Eucalyptus.

Determination of α- and β-eudesmols (15.38) and 1,8-cineole (29.83%) in foliage essential oil (*J. Wood Chem. Technol.* 1990, *10,* 543; *Chem. Abstr.* 1991, *114,* 49327 y).
Distribution: Introduced into India.

E. maculata Hook. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 276).

α-Pinene (70.0), 1,8-cineole (12.1) and β-pinene (2.3%) determined in essential oil by GC-MS (*J. Essent. Oil Res.* 1992, *4,* 259; *Chem. Abstr.* 1993, *118,* 219429 k).

E. maideni F.Muell. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 298).

1,8-Cineole (68.02%) determined in essential oil (4.4%) obtained from plant growing in Mile; Yunnan province (*Tianran Chanwu Yanjiu Yu Kaifa* 1991, *3,* 79; *Chem. Abstr.* 1992, *116,* 66881 h); determination of 1,8-cineole (76.8), α-pinene(13.1), α-terpineol (2.1) and aromadendrene (1.7%) in essential oil (*J. Essent. Oil Res.* 1992, *4,* 259; *Chem. Abstr.* 1993, *118,* 219429 k).

E. melliodora A.Cunn.

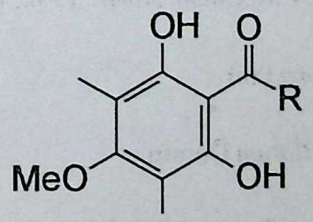
Eng. - Eucalyptus.

1,8- Cineole (75.8), α-pinene (17.9) and α-terpineol (1.1%) determined in essential oil (*J. Essent. Oil Res.* 1992, *4,* 259; *Chem. Abstr.* 1993, *118,* 219429 k).
Distribution: Introduced into India in plains and hills.

E. multiflora Poir. syn. *E. robusta* Smith (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 299).

Two new phloroglucinol derivatives (I and II) isolated from leaves (*Z. Naturforsch.* 1991, *46*B, 1275; *Chem. Abstr.* 1992, *116,* 55535 x); precursors of robustadials A and B synthesised (*J. Org. Chem.* 1993, *58,* 6163).

NEW COMPOUNDS



I
R = $CHMe_2$
II
R = CHMeEt

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BIOLOGICAL ACTIVITY

Phloroglucinol derivatives (I and II) inhibited phosphodiesterase activity (*Z. Naturforsch.* 1991, *46*C, 1275; *Chem. Abstr.* 1992, *116,* 55535 x).

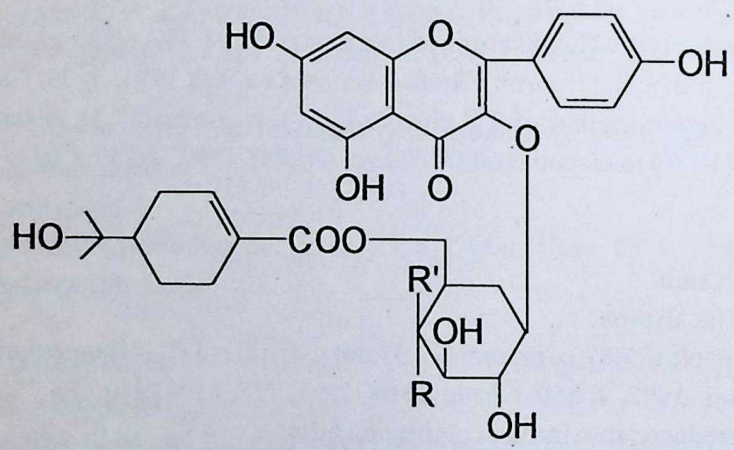
E. resinifera Sm.

Eng. - Eucalyptus.

Isolation of two new monoterpene flavonol glycosides - resinosides A and B - and their structure elucidation (*Biosci., Biotechnol., Biochem.* 1992, *56,* 138; *Chem. Abstr.* 1992, *117,* 188218 p).

Distribution: Introduced into India in the Nilgiris and Himachal Pradesh.

NEW COMPOUNDS



Resinoside A
R = OH, R' = H
Resinoside B
R = H, R' = OH

BIOLOGICAL ACTIVITY

Resinoside A exhibited repellent activity at 0.78 μ mol/cm^2 against *Mytilus edulis* (*Biosci., Biotechnol., Biochem.* 1992, *56,* 138; *Chem. Abstr.* 1992, *117,* 188218 p).

E. robusta Smith; see *E. multiflora* Poir.

E. tereticornis Sm.; see *E. umbellatum* Domin

E. torelliana F.Muell. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 278).

β-Pinene isolated (*Indian Perfum.* 1991, *35,* 8; *Chem. Abstr.* 1991, *115,* 78598 p).

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E. umbellatum Domin (*umbellata*) syn. *E. tereticornis* Sm. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 300).

Leaves and wood afforded gallic acid and 7β-D-glucosyloxy-5-hydroxy-2-methylchromone; wood also yielded β-sitosterol and (+)catechin (*J. Indian Chem. Soc.* 1991, *68,* 478).

E. youmoni Blakely & Mckie

H. & Eng. - Eucalyptus.

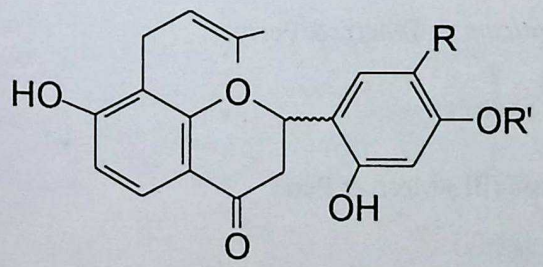
Determination of α- and β-eudesmols (50.05) and 1,8-cineole (30.7%) in foliage essential oil (*J. Wood Chem. Technol.* 1990, *10,* 543; *Chem. Abstr.* 1991, *114,* 49327 y).
Distribution: Introduced into India.

EUCHRESTA (Papilionaceae)

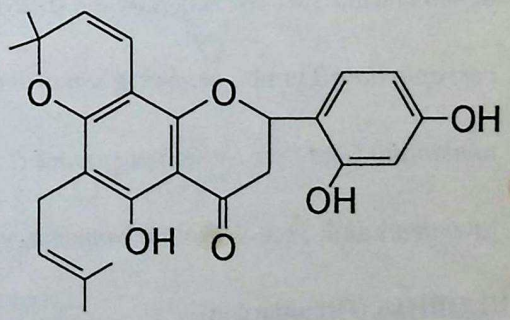
E. horsfieldii (Lesch.) Bennett (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 278).

Two new prenylflavanones - euchrenones a_7 and a_8 - isolated from roots and stems of plant grown in Yunnan, China and characterised as 7,2'4'-trihydroxy-8-γ, γ-dimethylallylflavanone and 7,2'-dihydroxy-8,5'-di(γ,γ-dimethylallyl)-4'-methoxyflavanone respectively; glabrol, maackiain and feruloylhexadecyl ester also isolated (*Phytochemistry* 1990, *29,* 2738); isolation of three new flavonoids - euchrenone a_9,euchrenone b_{10} and 2-methoxymaackiain - from roots of Thai plant and their structure elucidation; warangalone, osajin, 6,8-di(3,3-dimethylallyl)genistein, kushenol E, derrone 4'-O-methyl ether and alpinumisoflavone 4'-methyl ether also isolated (*Phytochemistry* 1990, *29,* 2663); four new prenylisoflavones - euchrenones b_6, b_7, b_8 and b_9 - isolated from stems of Thai plant along with warangalone, osajin, 6,8-di(3-methyl-2-butenyl)genistein, 8-O-methylretusin, maackianin and sophoracarpan B; structures of new compounds established (*Phytochemistry* 1990, *29,* 2675).

NEW COMPOUNDS



Euchrenone a_7
R,R' = H
Euchrenone a_8
R = $CH_2CH{=}CMe_2$, R' = Me, ~~ = α



Euchrenone a_9

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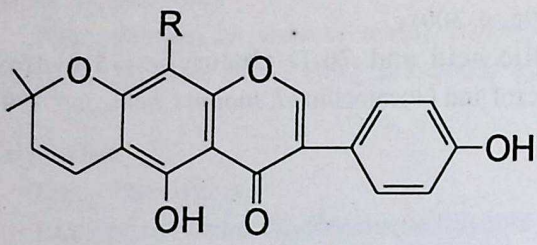
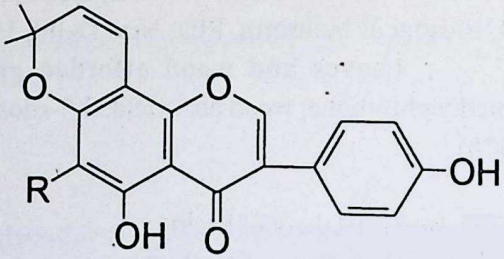
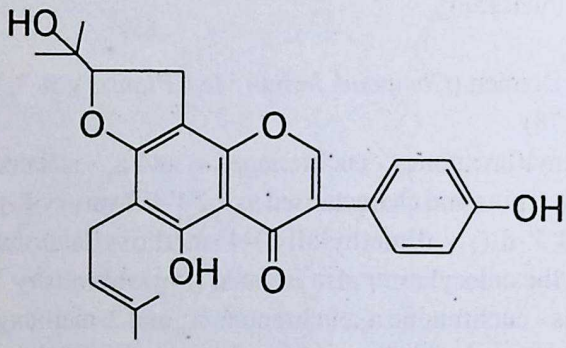


Euchrenone b_6
R = $CH_2CH_2C(OH)Me_2$
Euchrenone b_8
R = $CH_2CH(OH)C(Me)=CH_2$



Euchrenone b_7
R = $CH_2CH_2C(OH)Me_2$
Euchrenone b_9
R = $CH_2CH(OH)C(Me)=CH_2$



Euchrenone b_{10}

EUGENIA (Myrtaceae)

E. alternifolia Wight; see *Syzygium alternifolium* (Wight) Walp.

E. aquea Burm.f.; see *Syzygium aquea* (Burm.f.) Alston

E. caryophyllata Thunb.; see *Syzygium aromaticum* (L.) Merr. & Perry

E. jambolana Lam.; see *Syzygium cuminii* (L.) Skeels

E. javanica Lamk.; see *Syzygium samarangense* (Bl.) Merr. & Perry

EULOPHIA (Orchidaceae)

E. nuda Lindl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 301).

Isolation and structure elucidation of two new phenanthrene derivatives - 9,10-dihydro-

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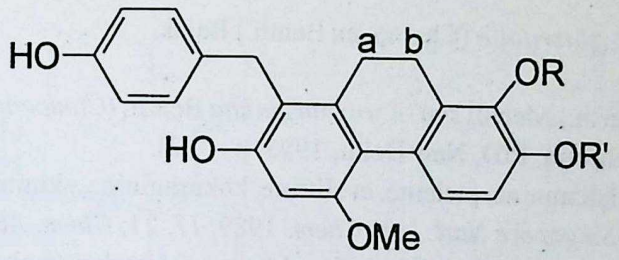
1-(4'-hydroxybenzyl)-4,7-dimethoxyphenanthrene-2,8-diol (I) and 1-(4'-hydroxybenzyl)-4,8-dimethoxyphenanthrene-2,7-diol (II); 3,4'-dihydroxy-5,3',5'-trimethoxybibenzyl and bis(4-hydroxybenzyl)ether also isolated (*Phytochemistry* 1989, *28*, 2463).

NEW COMPOUNDS



I
R = H, R' = Me
II
R = Me, R' = H, ab = Δ

EUODIA (EVODIA) (Rutaceae)

E. fraxinifolia (D.Don) Hook.f. syn. *Tetradium trichotomum* Lour. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 307).

Isolation of limonexic acid from stem and root bark and its structure determination; limonin, calodendrolide, α-allocryptopine and dictamnine also isolated (*Biochem. Syst. Ecol.* 1990, *18*, 251; *Chem. Abstr.* 1990, *113*, 208398 v).

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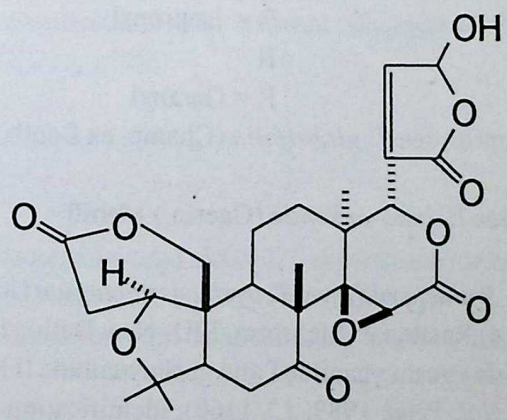

Limonexic acid

Note : The currently accepted binomial for this taxon is *E. trichotoma* (Lour.) Planch. *E. glabrifolia* (Champ. ex Benth.) Balak. syn. *E. miliaefolia* (Hance) Benth., *E. glauca* Miq., *Tetradium glabrifolium* (Champ. ex Benth.) T.G. Hartley (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 301).

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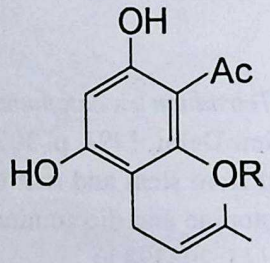
Fruits afforded rutaecarpine, evodiamine, dehydroevodiamine, skimmianine, limonin, evodol, 12α-hydroxyevodol, rutaevin, graucin A, quercetin-3-O-glucoside, quercetin-3-O-rutinoside, myricetin-3-O-rutinoside, taraxerone, phytosterols and long-chain alcohols (*Zhonghua Yaouxe Zazhi* 1993, *45*, 421; *Chem. Abstr.* 1994, *120*, 212548 f).

E. glauca Miq.; see *E. glabrifolia* (Champ. ex Benth.) Balak.

E. lunu-ankenda (Gaertn.) Merrill syn. *E. roxburghiana* Benth. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 302).

Isolation of dictamnine, pteleine, evolitrine, kokusaginine, skimmianine, evellerine and plastydesmine (*Bull. Singapore Natl. Inst. Chem.* 1989, *17*, 21; *Chem. Abstr.* 1991, *114*, 39186 n); two new fungicidal phenylethanones isolated from root bark and characterised as 1-[2',4'-dihydroxy-6'-(3"-methyl-2"-butenyloxy)-5'-(3"-methyl-2"-butenyl)phenylethanone (I) and 1-[2',4'-dihydroxy-6'-(3",7"-dimethylocta-2",6"-dienyloxy)-5'-(3"-methyl-2"-butenyl)]phenylethanone (II); lupeol and bergapten also isolated (*Phytochemistry* 1990, *29*, 243).

NEW COMPOUNDS



I
R = Isopropyl
II
R = Geranyl

E. miliaefolia (Hance.) Benth.; see *E. glabrifolia* (Champ. ex Benth.) Balak.

E. roxburghiana Benth.; see *E. luna-ankenda* (Gaertn.) Merrill

E. ruticarpa (Juss.) Benth. (*rutaecarpa*) syn. *Tetradium ruticarpum* (Juss.) T.G. Hartley (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 303).

Two new alkaloids - goshuyuamide I and goshuyuamide II isolated from fruits and their structures established (*J. Nat. Prod.* 1989, *52*, 1160); identification of cis-β-ocimene and trans-β-ocimene in fruit oil by GC-MS (*Sepu* 1991, *9*, 384; *Chem. Abstr.* 1992, *116*, 180989 z); isolation of limonin, limonin diosphenol and their 17β-D-glucopyranosides, 6β-hydroxy-5-epilimonin-17β-D-glucopyranoside and rutaevin from fruits (*Phytochemistry* 1991, *30*, 2365); evodene (30.82%) determined in fruit volatile oil (*Zhongguo Yaoxue Zazhi* 1993, *28*, 16; *Chem. Abstr.*

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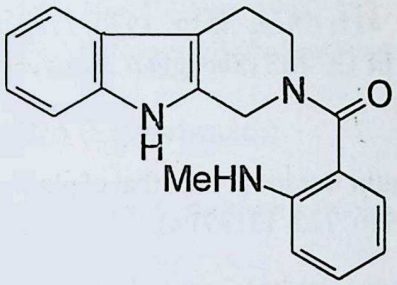
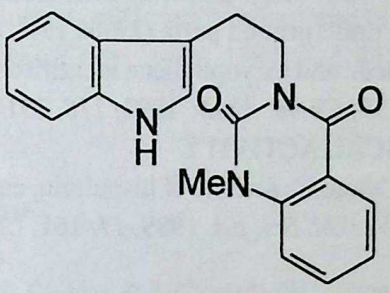
1993, *118,* 230162 p); a new glycoside - evodioside B - isolated from leaves and its structure elucidated along with rutin, hyperin, epimedoside C, guaijaverin, dehydroevodiamine, limonin and β-sitosterol (*Chem. Pharm. Bull.* 1993, *41,* 1472).

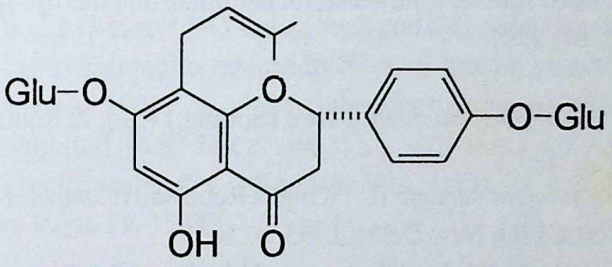
NEW COMPOUNDS



Goshuyuamide I



Goshuyuamide II



Evodioside B

BIOLOGICAL ACTIVITY

Evodiamine elicited concentration-dependent attenuation of contractile response evoked by phenylephrine in rat mesenteric artery. Its relaxant effect was mediated via adrenergic receptors (*Eur. J. Pharmacol.* 1992, *215,* 277).

EUONYMUS (Celastraceae)

E. echinatus Wall.

Bark afforded triacontane, cetyl alcohol, β-amyrin acetate and betulin (*Himalayan Chem. Pharm. Bull.* 1989, *6,* 21; *Chem. Abstr.* 1990, *112,* 52306 e).

Distribution: Himalayas, from Kashmir to Sikkim, alt. 2000 - 3000 m.

EUPATORIUM (Asteraceae)

E. adenophorum Spreng.; see *Ageratina adenophora* (Spreng.) King & Robinson

E. ayapana Vent.; see *E. triplinerve* Vahl

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E. cannabinum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 304).

Isolation of hispidulin, eupafolin, astragalin, kaempferol-3-rutinoside, hyperoside, isoquercitrin and rutin from aerial parts (*Pharm. Weekbl. Sci. Ed.* 1989, *11,* 161; *Chem. Abstr.* 1990, *112,* 131991 c); alantolactone, isoalantolactone and dihydroalantolactone isolated from aerial and underground parts (*Khim. Prir. Soedin.* 1990, 411; *Chem. Abstr.* 1990, *113,* 208420 w); bornylene and caryophyllene identified in volatile oil by GC-MS (*Zhongguo Zhongyao Zazhi* 1993, *18,* 39; *Chem. Abstr.* 1993, *118,* 251447 a).

BIOLOGICAL ACTIVITY

Cytotoxic activity of hispidulin, eupafolin and rutin was lower than that of plant extract (*Pharm. Weekbl. Sci. Ed.* 1989, *11,* 161; *Chem. Abstr.* 1990, *112,* 131991 c).

E. chinense L. syn. *E. reevesii* Wall. ex DC. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 280).

Aerial parts afforded squalene, taraxasterol palmitate and methylripariochromene A (*J. Indian Chem. Soc.* 1990, *67,* 930).

E. glandulosum Kunth ; see *Ageratina adenophora* (Spreng.) King & Robinson

E. odoratum L. syn. *Chromolaena odorata* (L.) King & Robinson (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 306).

Isolation of 5,6,7,4'-tetramethoxyflavanone, 4'-hydroxy-5,6,7-trimethoxyflavanone and 4,2'-dihydro-4',5',6'-trimethoxychalcone from aerial parts (*J. Bangladesh Chem. Soc.* 1991, *4,* 47; *Chem. Abstr.* 1992, *116,* 148159 t); geijerene (42.5) and β-cubebene (12.5%) determined by GC-MS in leaf oil of plant from Vietnam (*J. Essent. Oil Res.* 1992, *4,* 309; *Chem. Abstr.* 1993, *118,* 209414 n); geijerene and pregeijerene (34.1%) along with α-pinene (14.3) and γ-muurolene (9.8%) determined in essential oil of leaves of plant collected from Cameroon, whereas pregeijerene and geijerene (19.0%) along with p-cymene (22.2) and thymyl acetate (15.8%) determined in oil of leaves of plant collected from Congo (*J. Essent. Oil Res.* 1992, *4,* 101; *Chem. Abstr.* 1993, *118,* 187831s); determination of α-pinene (18.8), β-cubebene (13.0), β-caryophyllene (10.2%) in essential oil (0.11%) of flower tops (*Planta Med.* 1993, *59,* 283); saponification of flower fat yielded linolenic (31.23), linoleic (26.58), palmitic (26.35) and myristic (4.07%) acids (*Indian J. Nat. Prod.* 1993, *9*(1), 17; *Chem. Abstr.* 1994, *121,* 175196 n).

E. reevesii Wall. ex DC.; see *E. chinense* L.

E. riparium Regel.; see *Ageratia riparia* (Regel.) R.M. King & H. Robinson

E. triplinerve Vahl syn. *E. ayapana* Vent. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 310).

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Oil showed good activity *in vitro* against *Bacillus subtills, Diplococcus pneumoniae, Shigella flexneri, Vibrio cholerae, Ascaris lumbricoides* and *Taenia solium* (*Indian Perfum.* 1993, *37,* 318; *Chem. Abstr.* 1994, *121,* 42530 v).

Ayapanin, ayapin, thymoquinol dimethyl ether, thymoquinone and methyl thymyl ether isolated from aerial parts of plant collected in Daiyen Hanoi (*Planta Med.* 1993, *59,* 99); ayapin synthesised (*Indian J. Chem.* 1993, *32*B, 372); determination of thymohydroquinine dimethyl ether (50.36%) in flower oil (*Indian Perfum.* 1993, *37,* 318; *Chem. Abstr.* 1994, *121,* 42530 v).

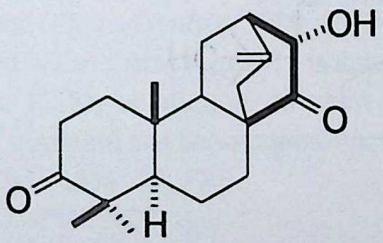
EUPHORBIA (Euphorbiaceae)

E. acaulis Roxb.; see *E. fusiformis* Buch.- Ham. ex D.Don

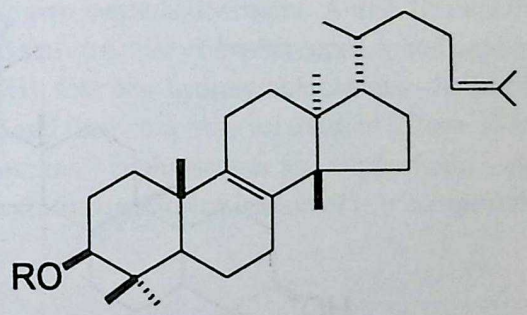
E. antiquorum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 307).

Isolation and structure determination of 3,12-di-O-acetyl-8-O-benzoylingol, 3,12-di-O-acetyl-8-O-tigloylingol, 12-O-acetyl-8-O-tigloylingol and 8-O-tigloylingol (*Chem. Pharm. Bull.* 1989, *37,* 1547); structure of antiquorin revised by X-ray diffraction which showed trans-fused A and B rings (*Phytochemistry* 1990, *29,* 3952); three new triterpenes - euphol-3-O-cinnamate, antiquols A and B - isolated from latex and their structures established; euphol, 24-methylenecycloartanol, cycloeucalenol, (Z)9-nonacosene, sitosterol and p-acetoxyphenol also isolated (*Phytochemistry* 1990, *29,* 1625).

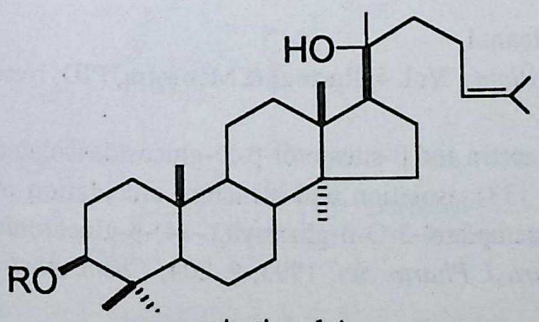
NEW COMPOUNDS



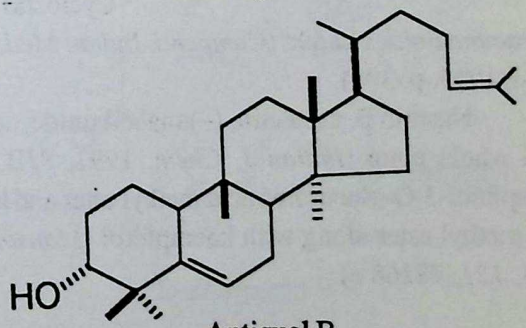
Antiquorin



Euphol 3-O-cinnamate
R = Cinnamoyl



Antiquol A
R = Cinnamoyl



Antiquol B

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BIOLOGICAL ACTIVITY

Euphol (i.v.) showed dose-dependent hypotensive activity ranging from slight to marked, in normotensive anaesthetised dogs and rats. It inhibited various autonomic pressor and depressor responses. Hypotensive effect was not affected in dogs by pretreatment with atropine, antistine or β-blockers. Its LD50 was 1.5 g/kg, i.p. and 2.0 g/kg by oral route in mice (*Planta Med.* 1989, *55*, 498).

E. cattimandoo W. Elliot syn. *E. trigona* sensu Hook.f., p.p. (non Haw.)

Isolation of taraxerone, taraxeryl acetate, taraxerol, ψ-taraxasterol, friedelan-3β-yl acetate, friedelan-3β-ol, friedelan-3α-ol, glut-5-en-3β-ol, cycloartenol and β-sitosterol from stems (*Acta Cienc. Indica, Chem.* 1988, *14*, 115; *Chem. Abstr.* 1990, *112*, 52229 g).

Distribution: Peninsular India and Andaman Islands.

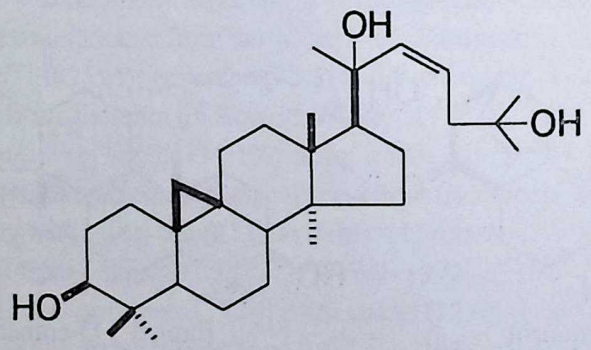
E. clarkeana Hook.f.

H. - Dudhi, Dudhni.

A new triterpene - cycloclarkeanol - isolated and its structure established; cycloartanol, cycloart-23-en-3β,25-diol and 20-acetylingenol-3-decadienoate also isolated (*J. Nat. Prod.* 1992, *55*, 959).

Distribution: Himalayas, Kashmir and Himachal Pradesh, ascending to 2000 m and plains of northern India.

NEW COMPOUNDS



Cycloclarkeanol

E. dracunculoides Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 308).

Nasutin B, esculetin, (–)anabellamide, acacetin and β-sitosterol-β-D-glucoside isolated from whole plant (*Indian J. Chem.* 1992, *31*B, 133); isolation and structure elucidation of kaempferol-3-O-glucuronic acid methyl ester and kaempferol-3-O-β-glucosyl(1→4)-β-glucuronic acid methyl ester along with kaempferol (*Mansoura J. Pharm. Sci.* 1993, *9*, 204; *Chem. Abstr.* 1994, *121*, 78268 e).

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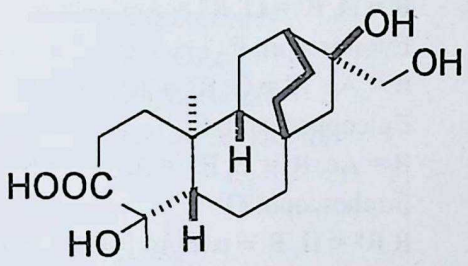
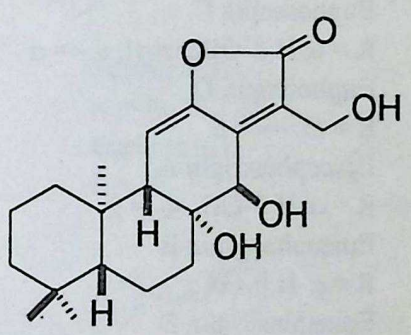
E. fusiformis Buch.-Ham. ex D.Don syn. *E. acaulis* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 308).

Isolation of a new ent-seco-atisane diterpene - ent-3,4-seco-4,16α,17-trihydroxyatisan-3-oic acid (I) - from rhizomes and its crystal structure determination (*J. Nat. Prod.* 1990, *53,* 470); a highly oxygenated ent-abietane diterpene isolated and characterised as (4R,4aR)-4,4a-dihydroxy-3-hydroxymethyl-7,7,10a-trimethyl-2,4,4a,5,6,6a,7,8,9,10,10a,10b-dodecahydro-phenanthro[3,2-b]furan-2-one (II) (*Phytochemistry* 1994, *35,* 1061).

NEW COMPOUNDS



I

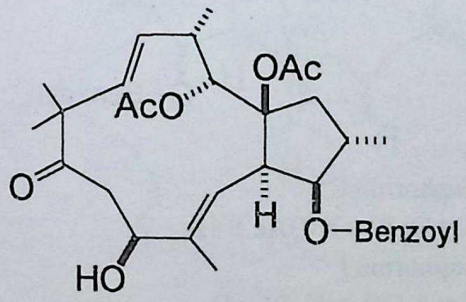


II

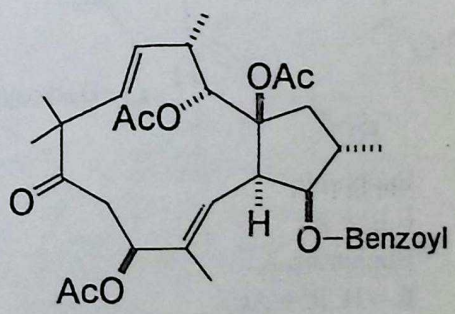
E. helioscopia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 310).

Isolation and structure elucidation of twelve euphoscopins A-L; four epieuphoscopins A, B, D and F; eleven euphornins A-K; two euphohelioscopins A and B; euphornin and euphohelionone from leaves and roots; crystal structure of euphoscopin A and euphornin also determined (*Phytochemistry* 1989, *28,* 3421); four new hydrolysable tannins - helioscopinins A and B and helioscopins A and B - isolated and their structures established (*Chem. Pharm. Bull.* 1990, *38,* 1518); isolation of two new tannins - euphorscopin and euphorhelin - along with geraniin, corilagin and helioscopinin A, and structure determination of new compounds (*Chem. Pharm. Bull.* 1991, *39,* 630).

NEW COMPOUNDS



Euphoscopin A



Euphoscopin B

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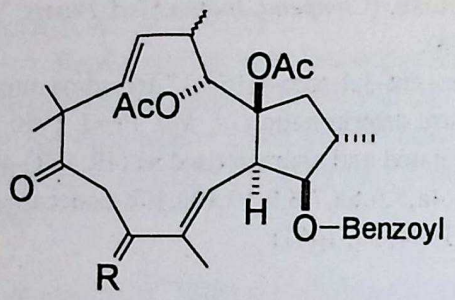
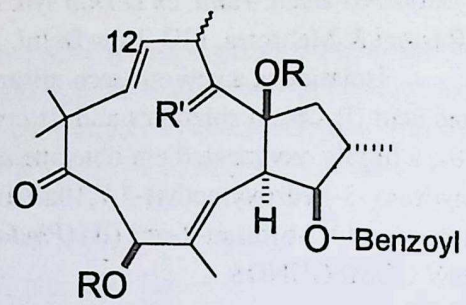
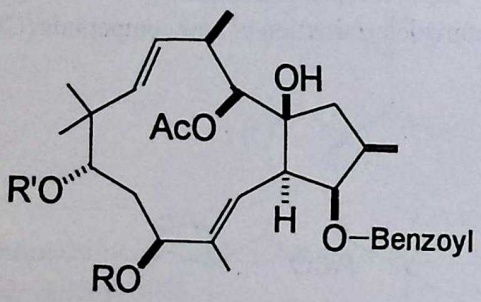


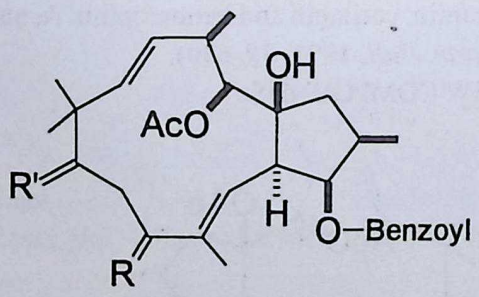
Euphoscopin C
R = α-H,β-OBenzoyl, ~~ = α
Euphoscopin D
R = O, ~~ = α
Epieuphoscopin A
R = α-H,β-OH, ~~ = β
Epieuphoscopin B
R = α-H,β-OAc, ~~ = β
Epieuphoscopin D
R = O, ~~ = β



Euphoscopin E
R = H, R' = O, R" = Ac, ~~ = α
Euphoscopin F
R = Ac, R' = O, R" = Ac, ~~ = α
Epieuphoscopin F
R = Ac, R' = O, R" = Ac, ~~ = β
Euphoscopin G
R,R" = H, R' = α-OAc,β-H, ~~ = α
Euphoscopin H
R = Ac, R' = α-OAc,β-H, R" = H,~~ = α
Euphoscopin I
R = H, R' = α-OH,β-H, R" = Ac, ~~ = α
Euphoscopin J
R = Ac, R' = α-OH,β-H, R"= Ac, ~~ = α
Euphoscopin K
R = Ac, R' = α-OH,β-H, R" = H, ~~ = α
Euphoscopin L
R = H, R' = O, R" = Ac, ~~ = α, Δ^{12} isomer



Euphornin
R,R' = Ac
Euphornin A
R = H, R' = Ac
Euphornin B
R = Ac, R' = H



Euphornin C
R = O, R' = α-OAc,β-H
Euphornin F
R = β-OH,α-H, R' = O
Euphornin G
R = β-OAc,α-H, R' = O

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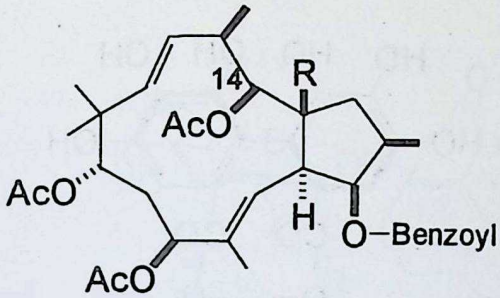
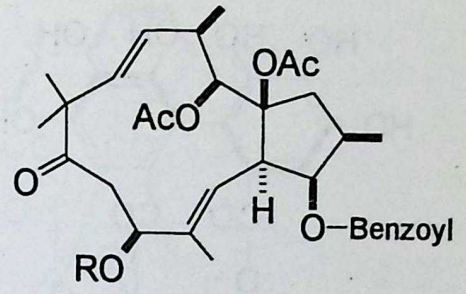
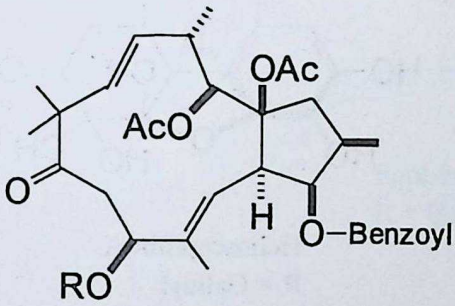


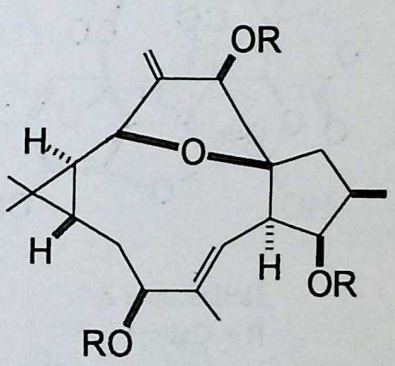
Euphornin D
R = OAc
Euphornin E
R = H, Δ^{14} isomer



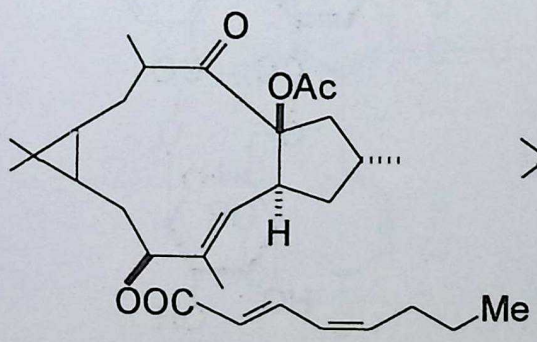
Euphornin H
R = Ac
Euphornin I
R = H



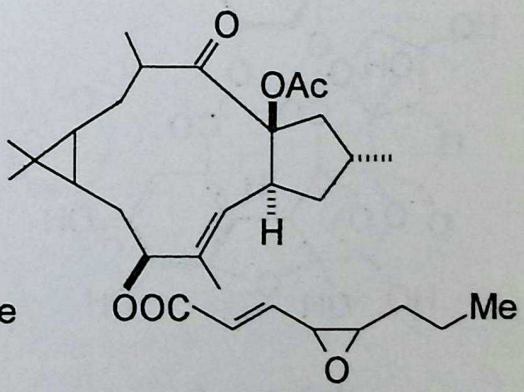
Euphornin J
R = Ac
Euphornin K
R = H



Euphohelionone
R = Benzoyl



Euphohelioscopin A



Euphohelioscopin B

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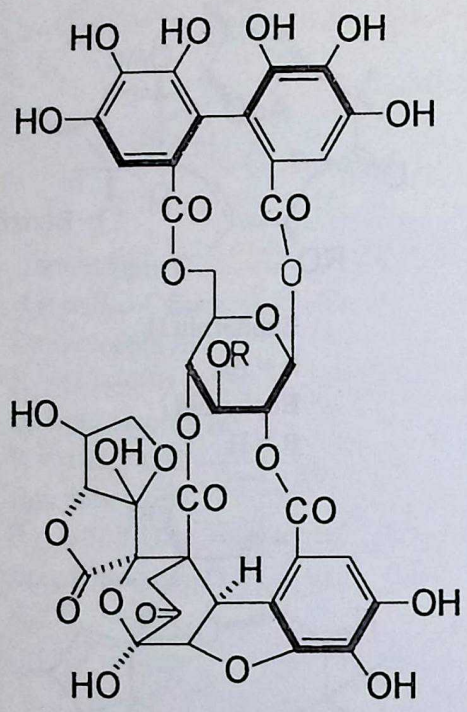
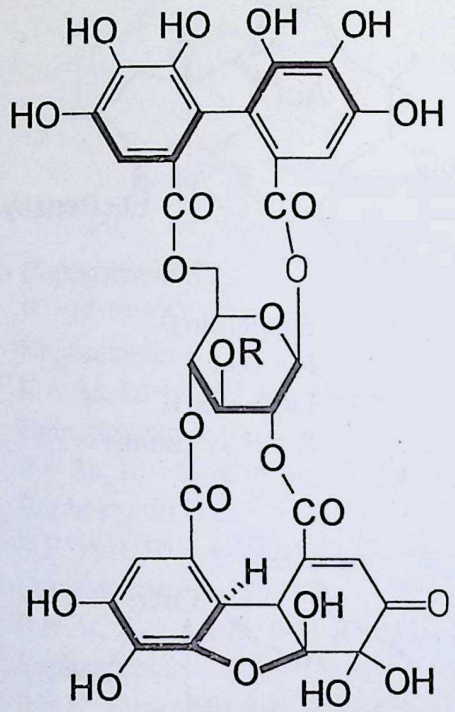
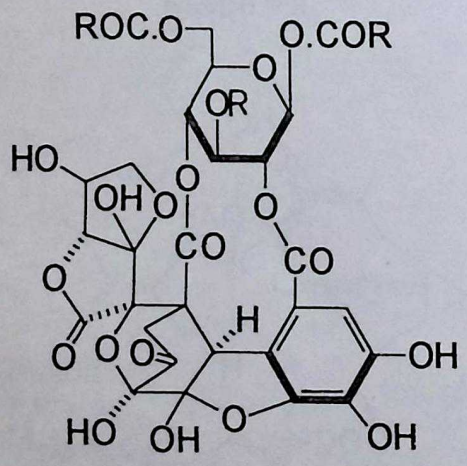


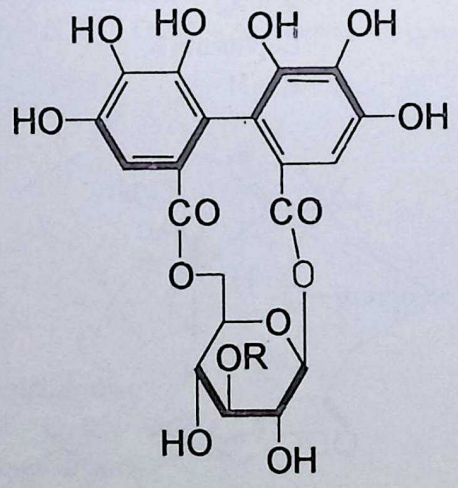
Helioscopin A
R = Galloyl



Helioscopinin A
R = Galloyl



Helioscopin B
R = Galloyl



Helioscopinin B
R = Galloyl

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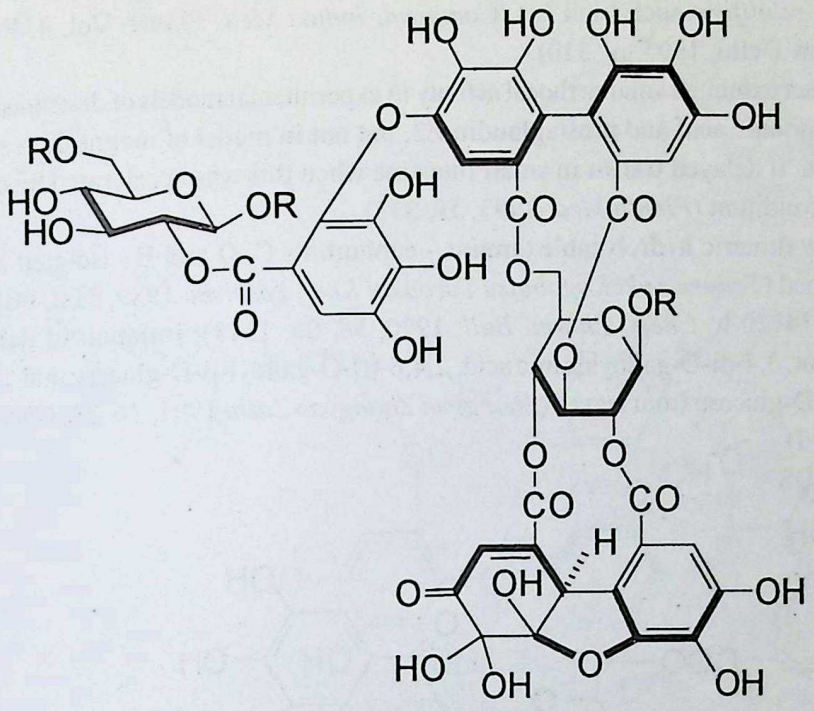
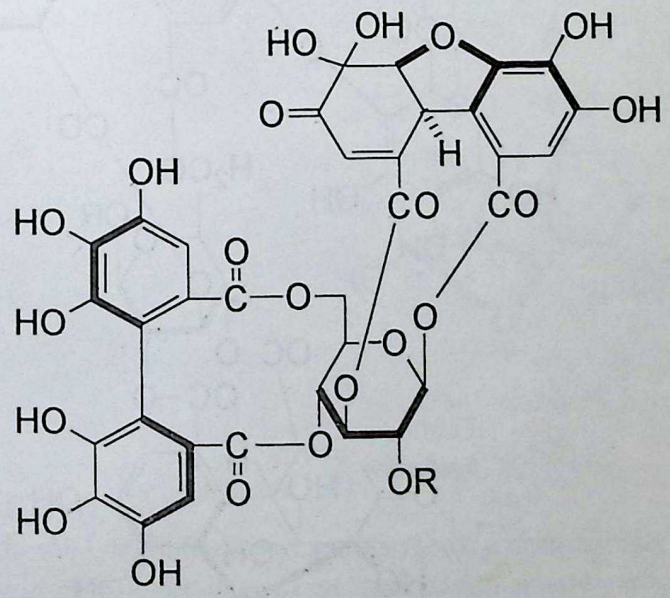


Euphorhelin
R = Galloyl



Euphorscopin
R = Galloyl

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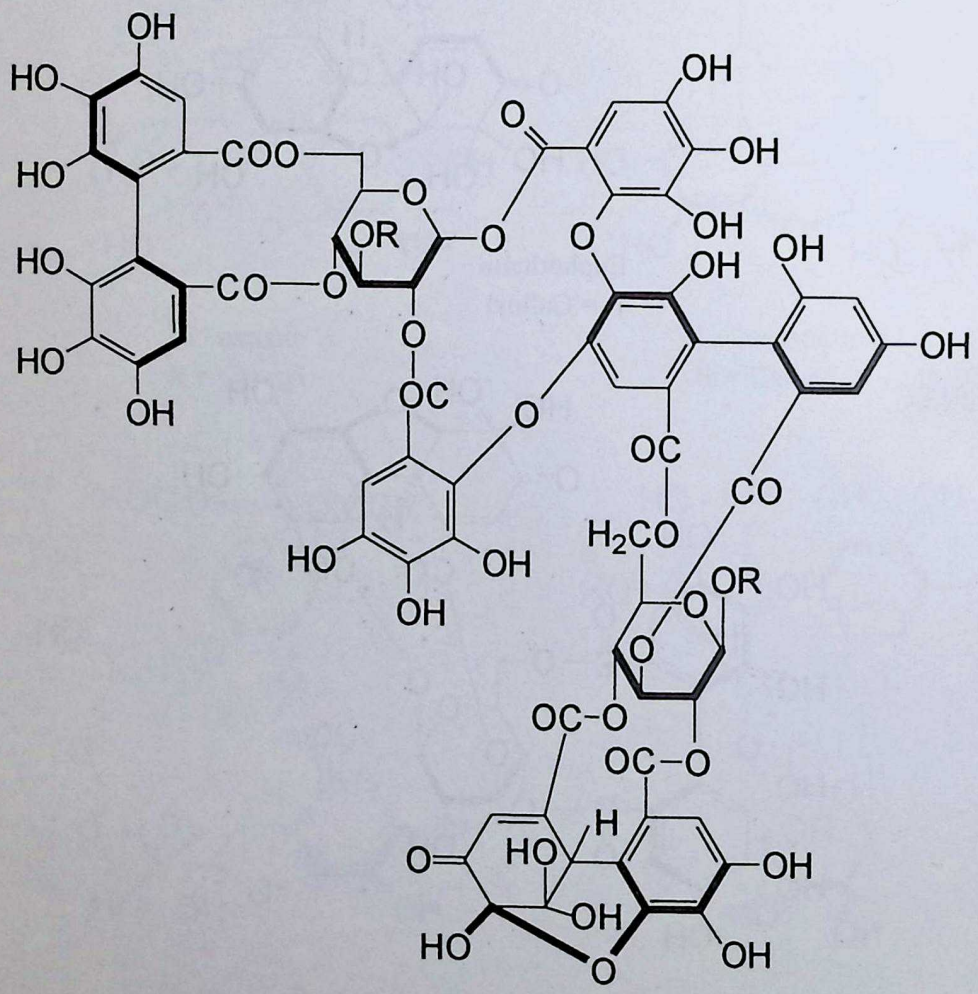
E. hirta L. syn. *E. pilulifera* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 310).

Plant extract exhibited antidiarrhoeal activity in experimental models of diarrhoea induced by castor oil, arachidonic acid and prostaglandin E2, but not in model of magnesium sulphate-provoked diarrhoea. It delayed transit in small intestine when this was accelerated by castor oil but not in normal condition (*Planta Med.* 1993, *59,* 333).

Three new dimeric hydrolyzable tannins - euphorbins C, D and E - isolated and their structures determined (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1989, 31st, 601; *Chem. Abstr.* 1990, *113,* 74720 h; *Chem. Pharm. Bull.* 1990, *38,* 86, 1113); isolation of gallic acid, quercetin, myricitrin, 3,4-di-O-galloylquinic acid, 2,4,6-tri-O-galloyl-β-D-glucose and 1,2,3,4,6-penta-O-galloyl-β-D-glucose from leaves (*Zhongguo Zhongyao Zazhi* 1991, *16,* 38; *Chem. Abstr.* 1991, *114,* 203549 f).

NEW COMPOUNDS



Euphorbin C
R = Galloyl

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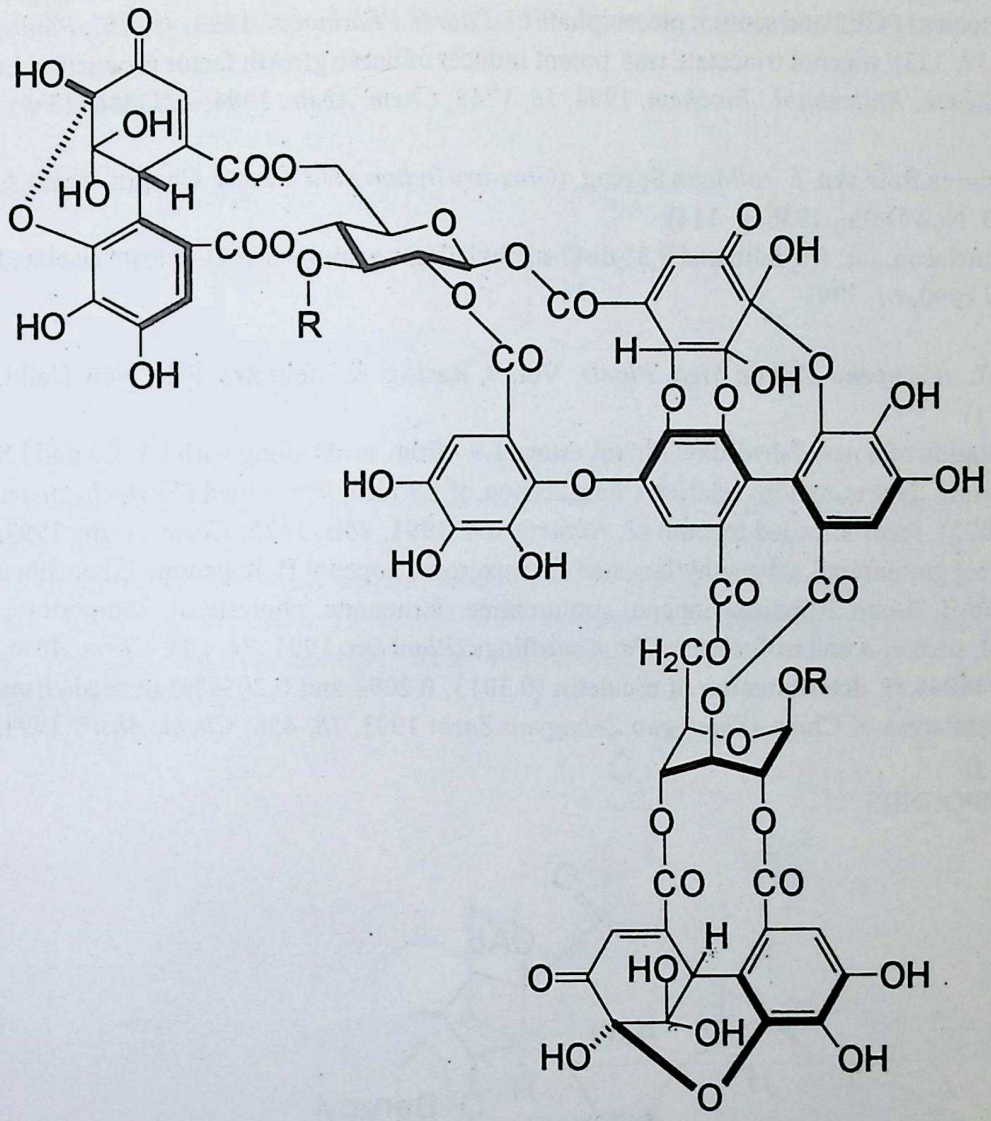

Euphorbin E
R = Galloyl

BIOLOGICAL ACTIVITY

Quercitrin (50.0 mg/kg) showed antidiarrhoeic activity against castor oil and PGE2-induced diarrhoea in mice. It also delayed rat small intestinal transit when this was accelerated with castor oil. However, when administered intraluminally it did not modify fluid transport

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across colonic mucosa either in normal condition or when this transport was altered by PGE2 or sodium picosulphate. Quercetin increased colonic fluid absorption only in presence of secretagogue compounds such as PGE2 and sodium picosulphate (*J. Pharm. Pharmacol.* 1993, *45,* 157; *Planta Med.* 1993, *59,* 333); ingenol triacetate was potent inducer of nerve growth factor production in L-M cells (*Biosci., Biotechnol., Biochem.* 1994, *58,* 1749; *Chem. Abstr.* 1994, *121,* 246113 w).

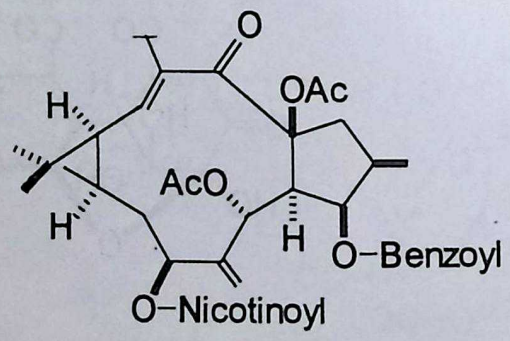
E. laeta Heyne ex Roth syn. *E. rothiana* Spreng. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 114).

Hentriacontane, friedelin and 3,3'-di-O-methylellagic acid-4'-O-β-D-xyloside isolated (*Fitoterapia* 1990, *61,* 379)

E. lathyrus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 311).

Isolation of a new 7-hydroxylathyrol ester - L9 - from seeds along with L1, L3 and L8 and its structure determination; relative configuration of L9 also determined (*Phytochemistry* 1990, *29,* 2025); seeds afforded ingenol (*Z. Naturforsch.* 1991, *46*B, 1425; *Chem. Abstr.* 1992, *116,* 21275 x); guimarenol, 24-methyllanosterol, taraxerone, hopenol B, hopenone I, hopenone II, hopenone B, 3-oxo-2-hydroxyhopane, simiarenone, fernenone, cholesterol, campesterol, stigmasterol, sitosterol and isofucosterol from seedlings (*Plant Sci.* 1991, *74,* 185; *Chem. Abstr.* 1991, *115,* 46048 t); determination of esculetin (0.3013, 0.2094 and 0.2046%) in seeds from three different areas of China (*Zhongguo Zhongyao Zazhi* 1993, *18,* 458; *Chem. Abstr.* 1994, *120,* 62392 j).

NEW COMPOUNDS



L9

E. neriifolia L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 285).

A new diterpene - neriifolene - isolated along with antiquorin and its structure established (*Phytochemistry* 1990, *29,* 662); molecular structure of neriifolene determined by X-ray studies (*Acta Crystallogr., Cryst. Struct. Commun.* 1992, *48*C, 753; *Chem. Abstr.* 1992, *117,* 8235 k); isolation of two glycosides - 3,4,3'-tri-O-methylellagic acid-4'-rutinoside and 3,4-di-O-

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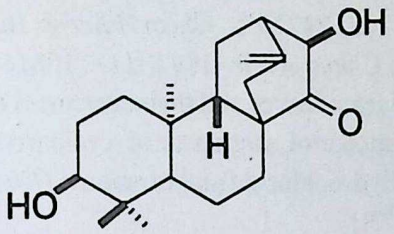
methylellagic acid-4'-rutinoside - from roots (*Bull. Singapore Natl. Inst. Chem.* 1991, *19*, 103; *Chem. Abstr.* 1992, *117*, 66567 f); diterpene - jolkinolide A - isolated from roots and characterised as ent-8α,14α-epoxyabieta-11,13(15)-dien-16,12-olide (*Bull. Singapore Natl. Inst. Chem.* 1993, *21*, 195; *Chem. Abstr.* 1994, *121*, 78316 u).

NEW COMPOUNDS

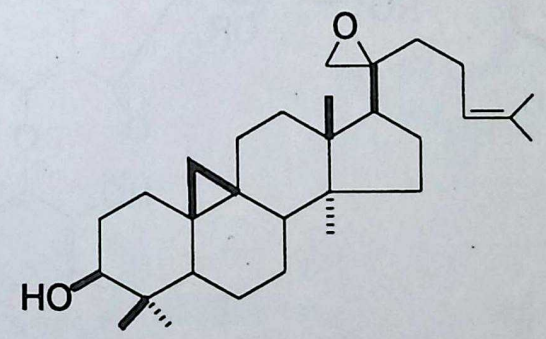


Neriifolene

E. nivulia Buch.-Ham. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 311).

Isolation and structure elucidation of a new cycloartane triterpenoid - cyclonivuliaol - from latex (*Indian J. Chem.* 1991, *30*B, 989); cycloartenol, cycloeucalenol and cycloart-25-en-3β,24-diol isolated from latex (*Fitoterapia* 1992, *63*, 82).

NEW COMPOUNDS



Cyclonivuliaol

BIOLOGICAL ACTIVITY

Cycloartenol, cycloeucalenol and cycloart-25-en-3β,24-diol exhibited antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* (*Fitoterapia* 1992, *63*, 82).

E. peplus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 312).

Simiarenone, nepehinol, alangidiol, cycloartenone, cycloartenol, 24-methylene-cycloartanol, obtusifoliol, citrostadienol and stigmasterol isolated from air-dried whole plant (*Fitoterapia* 1993, *64*, 85).

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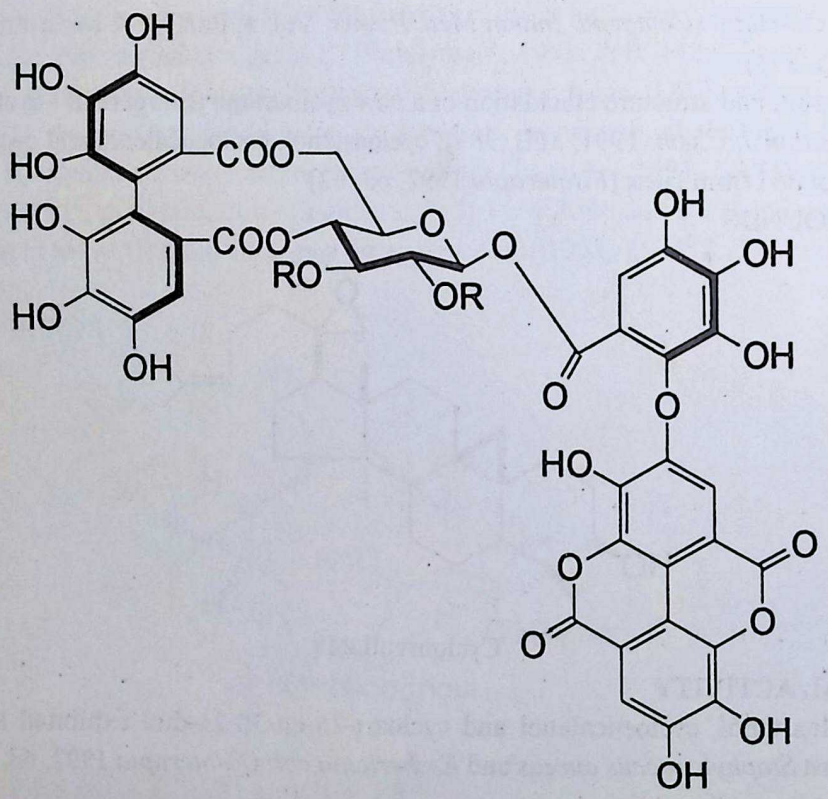
E. pilulifera L.; see *E. hirta* L.

E. prostrata W.Ait. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 313).

Rugosins A, B, D, E and G, tellimagrandins I and II, corilagin, geraniin, gallic acid and 1,2,3-tri-O-galloyl-D-glucose isolated (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1989, 31st, 601; *Chem. Abstr.* 1990, *113,* 74720 h; *Chem. Pharm. Bull.* 1990, *38,* 3296; *Zhongguo Zhongyao Zazhi* 1992, *17,* 225; *Chem. Abstr.* 1992, *117,* 108164 e); three new ellagitannins - prostratins A, B and C - isolated from leaves and their structures elucidated (*Chem. Pharm. Bull.* 1990, *38,* 3296); isolation of β-sitosterol, stigmasterol, cycloart-3β,25-diol, alanine, isoleucine, 2-aminobutyric acid, ornithine hydrochloride and threonine (*Fitoterapia* 1991, *62,* 453).

NEW COMPOUNDS



Prostratin A
R = Galloyl

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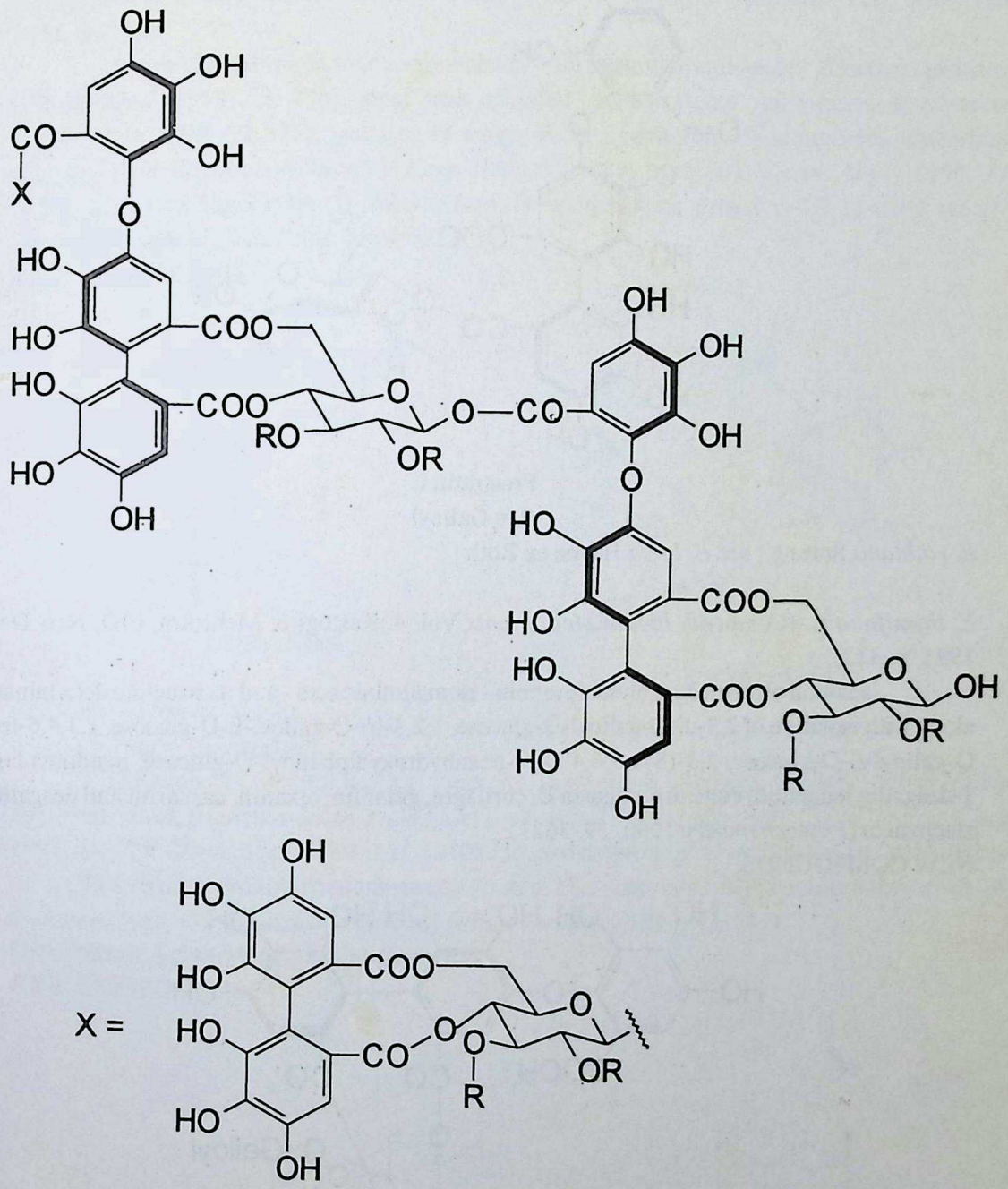

Prostratin B
R = Galloyl

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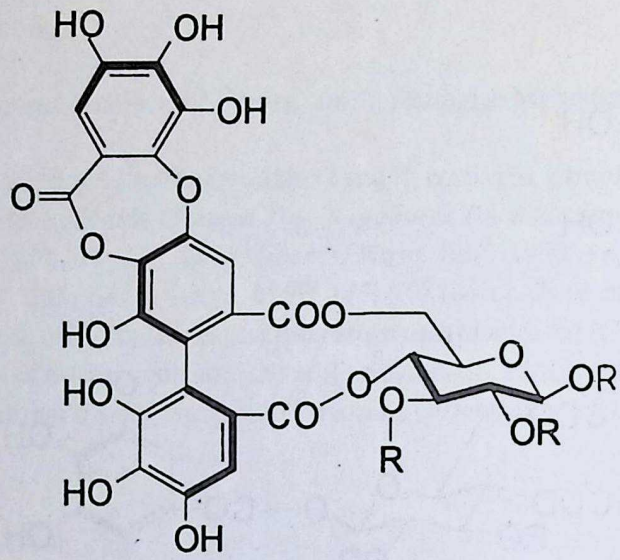


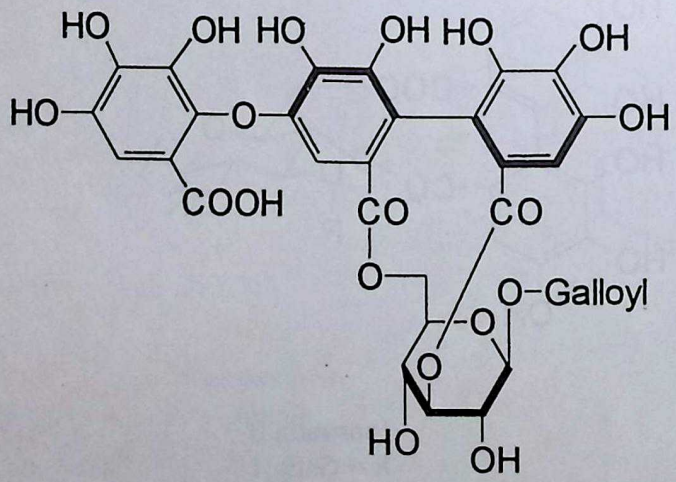
Prostratin C
R = Galloyl

E. rothiana Spreng.; see *E. laeta* Heyne ex Roth

E. thymifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 312).

Isolation of a new hydrolysable tannin - isomallotinic acid - and its structure determination along with isolation of 2,3-di-O-galloyl-D-glucose, 1,2,3-tri-O-galloyl-β-D-glucose, 1,3,4,6-tetra-O-galloyl-β-D-glucose, 2,3-(S)4,5,6,4',5',6'-hexahydroxydiphenoyl-D-glucose, pendunculagin, 1-desgalloyleugeniin, eugeniin, rugosin B, corilagin, geraniin, bixanin, casuariin and desgalloyl-stachyurin (*Phytochemistry* 1990, *29*, 3621).

NEW COMPOUNDS



Isomallotinic acid

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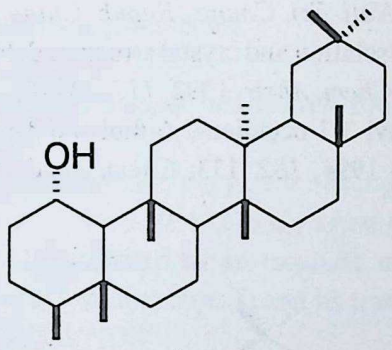
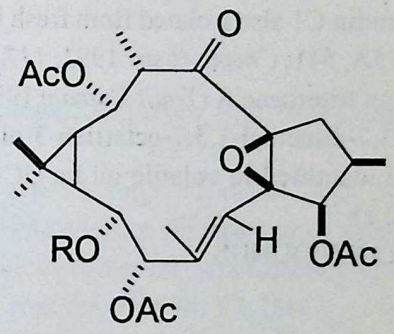
E. tirucalli L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 312).

A new triterpene - euphorcinol - isolated from fresh stem bark and its structure determined (*Planta Med.* 1989, *55,* 290); stem bark afforded cycloeucalenol and γ-taraxasteryl acetate (*Fitoterapia* 1989, *60,* 475); isolation of a new dimer - euphorbin F - along with euphorbin A (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1989, 31st, 601; *Chem. Abstr.* 1990, *113,* 74720 h); a new ingol ester (I) isolated from latex and characterised as 3,7,12-tri-O-acetyl-8-isovalerylingol (*J. Nat. Prod.* 1990, *53,* 728).

NEW COMPOUNDS



Euphorcinol



I
R = Isovaleryl

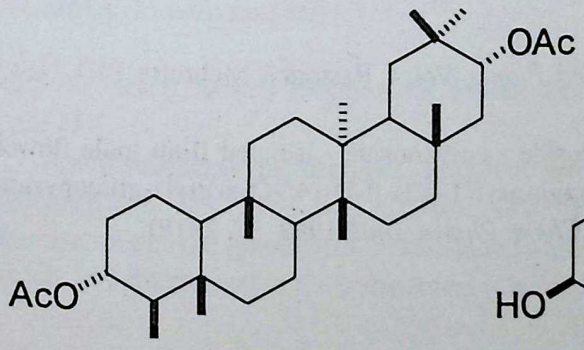
E. tortilis Rottle ex Ainslie

Tam. - Thirugakalli.

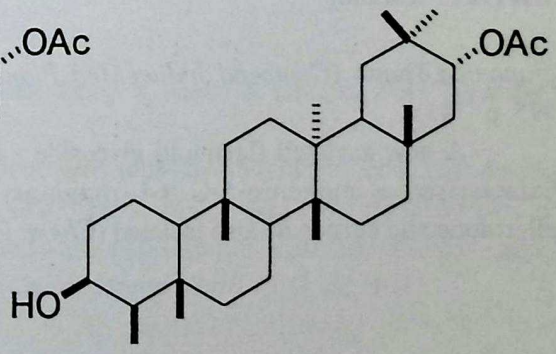
Isolation of taraxeryl acetate, taraxerol, taraxerone, friedelin, friedelan-3β-yl acetate, friedelan-3β-ol, friedelan-3α-ol, lupeol and β-sitosterol from stems (*Acta Cienc. Indica, Chem.* 1992, *18,* 375; *Chem. Abstr.* 1994, *121,* 104025 v); two new triterpenoids isolated and characterised as 3α,21α-diacetoxy-D:A-friedooleanane (I) and 21α-acetoxy-D:A-friedooleanane-3β-ol (II); cycloart-25-ene-3β,24-diol also isolated (*Phytochemistry* 1993, *33,* 647).

Distribution: Southern peninsular India.

NEW COMPOUNDS



I



II

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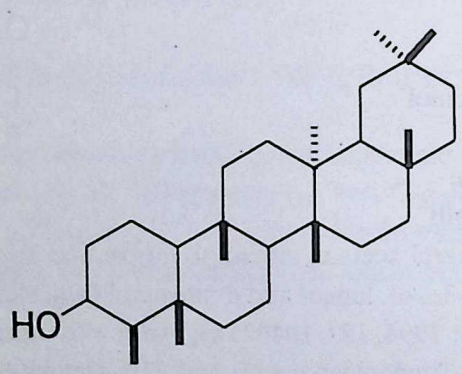
E. trigona Hook.f.; see *E. cattimandoo* W.Elliot

EUPHORIA (Sapindaceae)

E. longan (Lour.) Steud. syn. *Nephelium longana* (Lamk.) Camb., *Euphoria longana* Lamk., *Dimocarpus longan* Lour. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 287).

Two new tannins - acetonylgeraniin A and acetonylgeraniin B - isolated from seeds, both having acetonyl group at C-5 of dehydrohexahydroxy diphenoyl moiety, together with gallic acid, corilagin and chebulagic acid; in addition, (–)epicatechin, procyanidin B2 and procyanidin C1 also isolated from fresh bark (*Proc. Natl. Sci. Counc., Repub. China, Phys. Sci.* 1991, *15*A, 541; *Chem. Abstr.* 1992, *117,* 23256 m); isolation and crystal structure determination of longan triterpene A (*Youji Huaxue* 1992, *12,* 301; *Chem. Abstr.* 1992, *117,* 131404 s); linalool oxide, 3,7-dimethyl-1,5,7-octatrien-3-ol, 2,6-dimethyl-3,7-octadien-2,6-diol and β-phenylethyl alcohol identified in volatile oil by GC-MS (*Koryo* 1994, *182,* 133; *Chem. Abstr.* 1994, *121,* 279422 z).

NEW COMPOUNDS



Longan triterpene A

E. longana Lamk.; see *E. longan* (Lour.) Steud.

EURYA (Theaceae)

E. japonica Thunb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 313).

A new acylated flavonoid glycoside - euryanoside - isolated from male flowers and characterised as apigenin-5-O-α-L-rhamnosyl(1→2)-β-D-(6"-O-acetyl)-glucopyranoside; halleridone and cornoside also isolated (*Chem. Pharm. Bull.* 1989, *37,* 2819).

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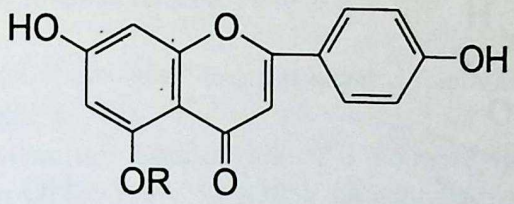
NEW COMPOUNDS



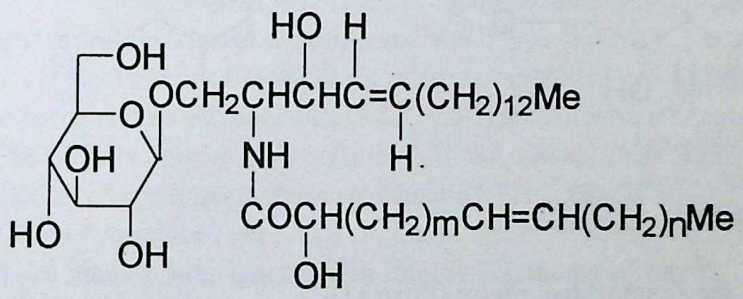
Euryanoside
R = Glu(6-acetyl)(2→1)Rha

EURYALE (Nymphaeaceae)

E. ferox Salisb. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 115).

Isolation of α-, β-, γ- and δ-tocopherols from seeds (*Donghai Xuebao* 1993, *34,* 1115; *Chem. Abstr.* 1994, *120,* 53276 x); a new cerebroside isolated from rhizomes with adventitious roots and characterised as an isomeric mixture of N-α-hydroxy-cis-octadecaenoyl-1-O-β-D-glucopyranosyl sphingosine (I) and its trans isomer (*J. Nat. Prod.* 1994, *57,* 138).

NEW COMPOUNDS



I
m + n = 13

EURYCOMA (Simaroubaceae)

E. longifolia Jack (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 115).

A new squalene-type triterpene - longilene peroxide - isolated from wood and its structure established (*Chem. Lett.* 1991, 2221; *Chem. Abstr.* 1992, *116,* 148211 d); isolation of a new abeo-picrasanolide type quassinoid - eurylactone - and two C19 and C20 quassinoids (I and II) from wood and elucidation of their structures (*Chem. Pharm. Bull.* 1993, *41,* 403).

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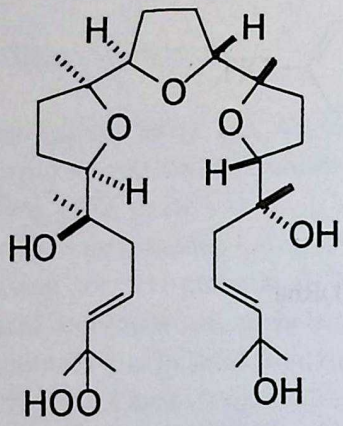
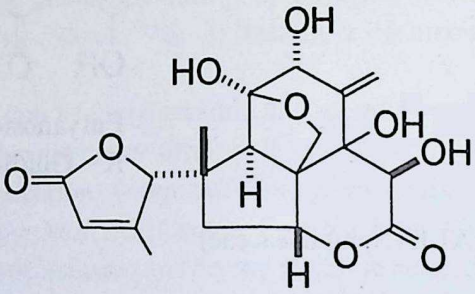
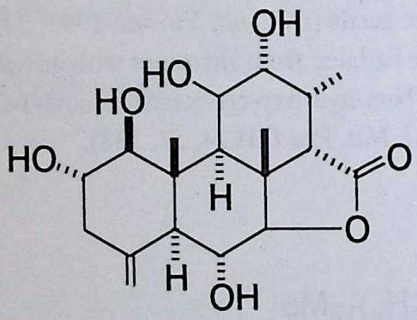
NEW COMPOUNDS



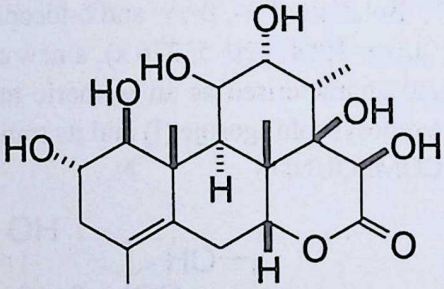
Longilene peroxide



Eurylactone



I



II

FAGARA (Rutaceae)

F. rhetsa Roxb.; see *Zanthoxylum rhetsa* (Roxb.) DC.

FAGONIA (Zygophyllaceae)

F. bruguieri DC. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 116).

Erythroxan diterpenes and flavonoids from aerial parts (*Phytochemistry* 1993, *33,* 718).

Note: *F. bruguieri* DC. has been treated as synonym of *F. cretica* L. (*Glossary Indian Med. Plants,* 1956, 116 and *W.I.* IV: 1, 1956) which is not correct. *F. bruguieri* DC. is a distinct species distributed in N.W. India (now in Pakistan) and westwards to Algeria. Correct name for Indian species, *F. arabica* Hook.f., *F. cretica* L. and *F. indica* Burm.f., described in Indian Flora, is *Fagonia schweinfurthii* Hadidi (*Compend. Indian Med. Plants,* Vol. 4, 1995, p. 314).

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FAGOPYRUM (Polygonaceae)

F. cymosum Meissn.; see *F. dibotrys* (D.Don) Hara

F. dibotrys (D.Don) Hara syn. *F. cymosum* Meissn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, p. 314).

Isolation and structure elucidation of 3',4'-methylenedioxy-7-hydroxy-6-isopentenylflavone (*J. Nat. Prod.* 1989, *52,* 1305); an antitumor proanthocyanidin mixture containing (–)epicatechin, 3-galloyl(–)epicatechin, procyanidin and 3,3'-digalloyl-procyanidin isolated from rhizomes (*Zhiwu Yanjiu* 1989, *11,* 215; *Chem. Abstr.* 1990, *112,* 171848 t); a method for extraction of procyanidin B2 from rhizomes developed (*Yaowu Fenxi Zazhi* 1990, *10,* 227; *Chem. Abstr.* 1990, *113,* 178357 m).

F. esculentum Moench (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 314).

Brassinolide and castasterone isolated from pollen (*Agric. Biol. Chem.* 1990, *54,* 757).

BIOLOGICAL ACTIVITY

Quercetin markedly inhibited (IC50 32.0 - 55.0 μM) growth of human gastric cancer cells *in vitro*. DNA synthesis was suppressed to 14.0% of control level by incubation with quercetin (70.0 μM) for two days (*FEBS Lett.* 1990, *260,* 10; *Chem. Abstr.* 1990, *112,* 111656 u; *Igaku no Ayumi* 1990, *154,* 379; *Chem. Abstr.* 1991, *114,* 272 n); quercetin (0.01 - 2.5 μM) exhibited dose-related inhibition of proliferation of ovarian cancer cell line OVCA 433 (*Anti-Cancer Drugs* 1990, 45; *Chem. Abstr.* 1991, *114,* 240112 d); quercetin inhibited cell proliferation and DNA formation by two human tumor cell lines (HepG-2, Caco-2) and a nontumor human small intestinal epithelial cell line (*Pharm. Pharmacol. Lett.* 1991, *1,* 64; *Chem. Abstr.* 1992, *117,* 204661 k); quercetin inhibited DNA synthesis in mouse leukaemia L7712 cells (IC50 23.1 μg/ml) (*Lanzhou Daxue Xuebao Ziran Kexueban* 1992, *28,* 128; *Chem. Abstr.* 1993, *119,* 62554 t); quercetin at 28.0 μg/ml *in vitro* caused 50% mortality in human carcinoma of larynx (Hep-2) cells, but inhibition of sarcoma-180 (S-180) cells was less (*Indian J. Pharmacol.* 1994, *26,* 266).

Quercetin caused significant decrease in ulcer index in acute gastric ulcer (both cold-restraint and pylorus-ligated models) with respect to control group in rats; significant difference was found in histamine secretion (*Phytother. Res.* 1993, *7,* 150; *Chem. Abstr.* 1993, *119,* 20259 v); quercetin, rutin or kaempferol (25.0 - 100.0 mg/kg, i.p.) inhibited in dose-dependent manner, gastric damage produced by acidified-ethanol in rats. Platelet-activating factor (PAF) present in mucosa, was found to be inhibited suggesting that protective effect of these substances is mediated by endogenous PAF (*Phytother. Res.* 1994, *8,* 179; *Chem. Abstr.* 1994, *121,* 245805 m); at 10.0 μM, flavone inhibited electrically-induced contractions by 50.5% whereas kaempferol and quercetin showed very weak inhibition (17.3 and 13.0% respectively) in guinea pig isolated ileum. At higher concentrations (30.0 μM - 100.0 μM), they showed inhibition in a concentration-dependent manner (*J. Ethnopharmacol.* 1991, *34,* 279; *Chem. Abstr.* 1992, *116,* 34270 s); quercetin

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(1.0 μM - 100.0 μM) inhibited in a concentration-dependent manner concentrations induced in vascular smooth muscle of rats by noradrenaline, high concentration of KCl and Ca^{2+}. This vasodilator effect was observed whether quercetin was administered before or after inducing concentration (*Eur. J. Pharmacol.* 1993, *239*, 1,7); quercetin, chrysin, luteolin and 7,8-benzoflavone inhibited ethoxyresorufin deethylase activity in human and rat liver microsomes. In man, compounds without hydroxyl groups are more powerful inhibitors than polyhydroxylated flavonoids (7,8-benzoflavone>chrysin>luteolin>quercetin>morin) and human microsomes are more sensitive than rat microsomes (*Food Addit. Contam.* 1990, *7*, (Suppl.1), 178; *Chem. Abstr.* 1991, *114*, 156582 z); quercetin, its 3-O-glucoside and isoquercetin, at 0.1 mg/ml, inhibited DNA polymerase of hepatitis B virus by 42.0 to 51.0% and, therefore, may be useful for treatment of hepatitis B (Jpn. 4, 234,320 (1992) Aug. 24; *Chem. Abstr.* 1992, *117*, 226302 w); quercetin inhibited aldose reductase with IC50 34.4 μM (*Zhongguo Zhongyao Zazhi* 1993, *18*, 623; *Chem. Abstr.* 1994, *112*, 95386 p); quercetin (6.25 to 50.0 mg/kg, i.p.) significantly reduced intestinal transit in mice and this effect was antagonised by yohimbine and phentolamine. Quercetin (12.5 to 50.0 mg/kg) also reduced intraluminal accumulation of fluid and diarrhoea induced by castor oil and these effects were antagonised by yohimbine (*Phytother. Res.* 1994, *8*, 42; *Chem. Abstr.* 1994, *121*, 26617 y); quercetin (200.0 mg/kg, i.g., 14d) decreased activities of Na^{+}-K^{+}-exchanging ATPase of rat brain plasma membrane and heart sarcolemma and Ca^{2+}-Mg^{2+}-ATPase of heart sarcolemma membrane (*Zhongguo Yaoli Xuebao* 1994, *15*, 414; *Chem. Abstr.* 1994, *121*, 195485 j).

FERNANDOA (Bignoniaceae)

F. adenophylla (Wall. ex G.Don) V. Steenis syn. *Heterophragma adenophyllum* Seem. ex Benth. & Hook; *Haplophragma adenophyllum* (DC.)Dop (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 292).

β-Amyrin, ursolic acid and oleanolic acid isolated (*Fitoterapia* 1991, *62*, 459).

FERONIA (Rutaceae)

F. elephantum Correa; see *F. limonia* (L.) Swingle

F. limonia (L.) Swingle syn. *F. elephantum* Correa (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 292).

Oil exihibited remarkable antimicrobial activity against *Candida albicans* and *Cryptococcus neoformans.*

Estragole (76.0), trans-anethole (13.5) and cis-anethole (2.1%) determined in leaf oil (*Zagazig J. Pharm. Sci.* 1993, *2*, 150; *Chem. Abstr.* 1994, *121*, 91438 e).

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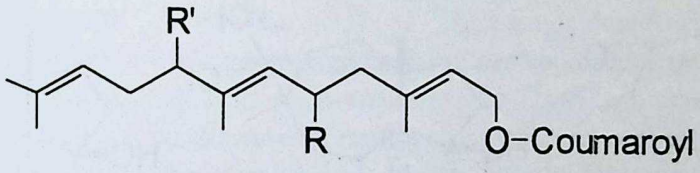
FERULA (Apiaceae)

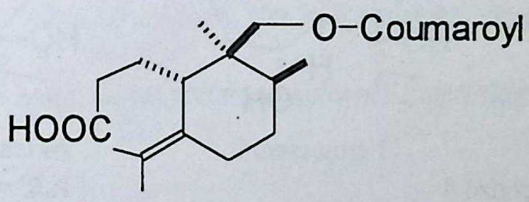
F. assa-foetida L. syn. *F. foetida* Regel (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 317).

^{13}C-NMR of farnesiferol B (*Pharmazie* 1994, *49,* 542; *Chem. Abstr.* 1994, *121,* 78412 x); three new sesquiterpene coumarin ethers - 5- and 8-hydroxyumbelliprenins and 8-acetoxy-5-hydroxyumbelliprenin - isolated and characterised; structure of asacoumarin B revised and found to be identical to galbanic acid (*Phytochemistry* 1994, *35,* 183).

NEW COMPOUNDS



5-Hydroxyumbelliprenin
R = OH, R' = H
8-Hydroxyumbelliprenin
R = H, R' = OH
8-Acetoxy-5-hydroxyumbelliprenin
R = OH, R' = OAc



Asacoumarin B

BIOLOGICAL ACTIVITY

Luteolin inhibited proliferation of human carcinoma of larynx (Hep-2) and sarcoma-180 cells and the inhibitory concentration of 21.0 μg/ml was close to that of the anticancer drug plumbagin (10.0 μg/ml). Depletion of glutathione in cells coupled with loss of cells viability was observed in luteolin-treated cultures. Further, [^{3}H]thymidine uptake studies revealed decline in DNA synthesis in presence of luteolin (*Indian J. Pharmacol.* 1994, *26,* 266).

F. foetida Regel; see *F. assa-foetida* L.

F. jaeschkeana Vatke (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 318).

Five new sesquiterpene esters - jaeskeanin, jaeskeanidin, ferutinone, ferutinianin and

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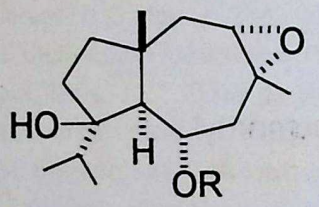
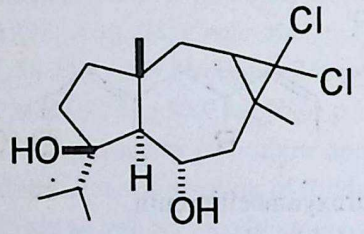
angeloylferutinianin - isolated from roots and their structures elucidated; in addition, teferidine, ferutinin, epoxyfarnochrol, drimatol, jaeskeanadiol, its salicylate, angelate and 3,4-dihydroxybenzoate isolated (*Phytochemistry* 1989, *28,* 3389); isolation of a new isocarotane - ferujaesenol - and three new carotanes - akichenol, 9β-O-angeloylakichenol and 5α-O-p-hydroxybenzoylakichenol - from rhizomes and their characterisation (*Phytochemistry* 1990, *29,* 531); rhizomes afforded two new jaeschkeanadiol derivatives characterised as jaeschkenol and 2α,3α-dihydroxy-4-keto-5α-p-hydroxybenzoyl-jaeschkeanadiol (I) (*J. Nat. Prod.* 1993, *56,* 539).

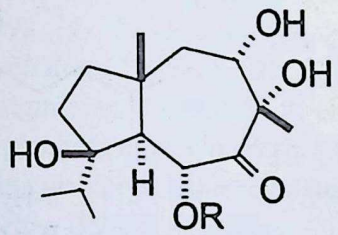
NEW COMPOUNDS



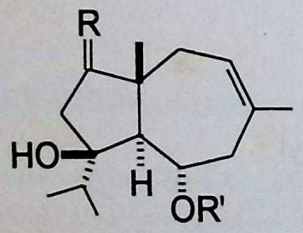
Jaeskeanin
R = 4-Hydroxybenzoyl



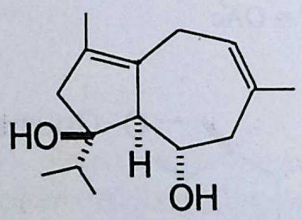
Jaeschkenol



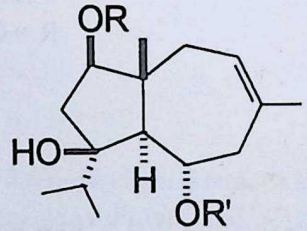
I
R = 4-Hydroxybenzoyl



Ferutinone
R = O, R' = 4-Hydroxybenzoyl
Jaeskeanidin
R = H,H, R' = 3,4-Methylene-dioxybenzoyl
Ferutinianin
R = H,H, R'= 3,4-Dihydroxybenzoyl
Angeloylferutinianin
R = H,Angeloyl, R' = 3,4-Dihydroxybenzoyl



Ferujaesenol



Akichenol
R,R' = H
5α-O-4-Hydroxybenzoyl-akichenol
R = H, R' = 4-Hydroxybenzoyl
9β-O-Angeloylakichenol
R = Angeloyl, R' = H

FICUS (Moraceae)

F. auriculata Lour. syn. *F. roxburghii* Wall. ex Miq. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 319).

Herniarin isolated from Egyptian plant (*Bull. Fac. Pharm.,* Cairo Univ., 1993, *31,*19; *Chem. Abstr.* 1994, *120,* 212573 k).

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F. benghalensis L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 293).

A polysaccharide which on hydrolysis afforded xylose, arabinose and small amounts of glucose and galactose, isolated from fruits; fractionation of polysaccharide yielded xylan (*Bangladesh J. Sci. Ind. Res.* 1992, *27,* 141; *Chem. Abstr.* 1993, *118,* 165217 u).

BIOLOGICAL ACTIVITY

Oral administration of dimethyl ether of leucocyanidin-3-O-β-D-galactosylcellobioside (0.1 g/kg) for one month to normal and moderately diabetic rats decreased blood and urine sugar, certain lipid components in serum and tissues and glucose-6-phosphatase activity in liver; hypoglycaemic response was enchanced when it was given along with low dose of insulin (*Indian J. Biochem. Biophys.* 1989, *26,* 400; *ibid.* 1994, *31,* 73); a single dose (0.25 g/kg) of dimethyl ether of pelargonidin-3-O-α-L-rhamnoside given to moderately diabetic rats decreased fasting blood glucose by 19.0% and improved glucose tolerance by 29.0%, while administration of 0.1 g/kg/day for one month caused decrease in fasting blood glucose level to almost half that of pretreatment level, and urine sugar level decreased to traces in both groups (*Indian J. Biochem. Biophys.* 1992, *29,* 380).

F. benjamina L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 118).

α-Amyrin, bergapten and imperatorin isolated from latex of Egyptian plant (*Bull. Fac. Pharm.,* Cairo Univ., 1989, *27,* 99; *Chem. Abstr.* 1990, *113,* 3245 w).

F. carica L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 320).

Calotropenyl acetate, lupeol acetate and oleanolic acid identified in leaves (*Fitoterapia* 1990, *61,* 373).

F. elastica Roxb. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 187).

α-Amyrin and bergapten isolated from latex of Egyptian plant (*Bull. Fac. Pharm.* Cario Univ., 1989, *27,* 99; *Chem. Abstr.* 1990, *113,* 3245 w).

F. foveolata Hook.f.; see *F. sarmentosa* Buch.-Ham. ex J.E. Smith var. *thunbergii* (Maxim.) Corner

F. glomerata Roxb.; see *F. racemosa* L.

F. hispida L.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 320).

Isolation of a new leucocyanin from roots and its characterisation as leucocyanidin-3-

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O-α-D-glucosyl(1→4)-O-β-D-arabinopyranoside (*Proc. Natl. Acad. Sci. India* 1990, *60*A, 281; *Chem. Abstr.* 1991, *115,* 68478 k); oleanolic acid isolated from leaves (*Indian J. Nat. Prod.* 1990, *6*(2), 14; *Chem. Abstr.* 1992, *116,* 124878 a).

F. infectoria Roxb.; see *F. virens* Ait.

F. krishnae DC.

Eng.- Krishna bor.

Isolation of 8,8-dimethyl-5-hydroxy-2-(4'-hydroxyphenyl)4H,8H-benzo[1,2-b:3,4-b']-pyran-4-one along with β-sitosterol and a mixture of long-chain olefinic hydrocarbons (*J. Indian Chem. Soc.* 1993, *70,* 785).

Distribution: Calcutta gardens.

Note : The binomial, *F. krishnae* was given by C. de C. 1901. However, according to Biswas (*Curr. Sci.* 3: 1934-35, 424) and Benthall (*The Trees of Calcutta and its Neighbourhood,* 1946, 416) this tree is a horticultural variety or mutant of *F. benghalensis.*

F. palmata Forsk. syn. *F. pseudosycomorus* Decne. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 320).

Bergapten isolated from Egyptian plant (*Bull. Fac. Pharm.,* Cairo Univ., 1993, *31,* 19; *Chem. Abstr.* 1994, *120,* 212573 k).

F. pseudosycomorus Decne.; see *F. palmata* Forsk.

F. racemosa L. syn. *F. glomerata* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 321).

Petroleum ether extract of stem bark significantly reduced blood level of rats with streptozotocin-induced diabetes. It completely inhibited glucose-6-phosphate and arginase but activated glucose-6-phosphate dehydrogenase from rat liver. Extracts of fruit and latex did not show any significant effect on blood sugar level of diabetic rats, they inhibited only glucose-6-phosphate but not arginase from rat liver (*Pure Appl. Chem.* 1994, *66,* 2287; *Chem. Abstr.* 1994, *121,* 271839 v).

Bergenin, lupeol acetate and β-sitosterol isolated (*J. Bangladesh Chem. Soc.* 1991, *4,* 247; *Chem. Abstr.* 1992, *117,* 23267 r); bergapten isolated from Egyption plant (*Bull. Fac. Pharm.,* Cairo Univ., 1993, *31,* 19; *Chem. Abstr.* 1994, *120,* 212573 k).

F. roxburghii Wall. ex Miq.; see *F. auriculata* Lour.

F. sarmentosa Buch.-Ham. ex J.E. Smith var. *thunbergii* (Maxim.) Corner syn. *F. foveolata* sensu Hook.f., p.p., *F. thunbergii* Maxim.

Two new triterpenoids - rhoiptelenol and 3α-hydroxy-isohop-22(29)-en-24-oic acid -

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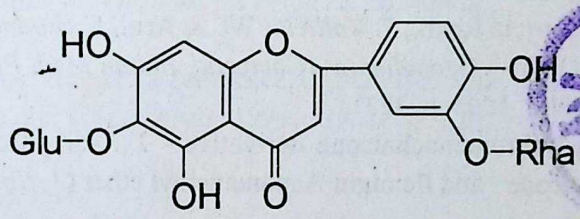
isolated from fresh leaves and stem and their structures established; in addition, lupenyl acetate, lupeol, taraxerol, glutinol, α- and β-amyrins, their acetates, ursolic and betulinic acids isolated (*Chem. Pharm. Bull.* 1994, *42,* 608).
Distribution: Himalayas, from Himachal Pradesh to Bhutan and Meghalaya, alt. 600-2100 m.

F. thunbergii Maxim.; see *F. sarmentosa* Buch.-Ham. ex J.E. Smith var. *thunbergii* (Maxim.) Corner

F. virens Ait. syn. *F. infectoria* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 321).

Isolation and characterisation of a new flavone glycoside - infectoriin - from leaves (*J. Chem. Res., Synop.* 1990, 396; *Chem. Abstr.* 1991, *114,* 98280 m); a new diglycoside isolated from leaves and its structure determined as scutellarein-6-O-α-L-rhamnopyranosyl(1→2)-β-D-galactopyranoside (*J. Chem. Res., Synop.* 1991, 218; *Chem. Abstr.* 1991, *115,* 228348 y); sorbifolin 6-O-[α-L-arabinopyranosyl(1→2)-β-D-glucopyranoside and scutellarein-6-O-β-D-glucoside isolated from leaves (*Fitoterapia* 1994, *65,* 94).
NEW COMPOUNDS



Infectoriin

FLACOURTIA (Flacourtiaceae)

F. indica (Burm.f.) Merr. syn. *F. ramontchii* L'Herit., *F. ramontchii* L'Herit. var. *sapida* (Roxb.) Hook.f. & Thoms., *F. ramontchii* L'Herit. var. *latifolia* Hook.f. & Thoms., *F. ramontchii* L'Herit. var. *occidentalis* Hook.f. & Thoms., *F. sepiaria* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 322).

A new butyrolactone lignan disaccharide - ramontoside - isolated from heartwood and characterised as diphyllin-4-O-[β-D-glucosyl(1→4)]-β-2,3-di-O-methyl-D-xyloside (*Phytochemistry* 1991, *30,* 1026).

F. ramontchii L'Herit.; see *F. indica* (Burm.f.) Merr.

F. ramontchii L'Herit. var. *latifolia* Hook.f. & Thoms.; see *F. indica* (Burm.f.) Merr.

F. ramontchii L'Herit. var. *occidentalis* Hook.f. & Thoms.; see *F. indica* (Burm.f.) Merr.

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F. ramontchii L'Herit. var. *sapida* (Roxb.) Hook.f. & Thoms.; see *F. indica* (Burm.f.) Merr.

F. sepiaria Roxb.; see *F. indica* (Burm.f.) Merr.

FLEMINGIA (Papilionaceae)

F. congesta Ait.; see *F. macrophylla* (Willd.) O.Ktze. ex Merr.

F. congesta Ait. var. *latifolia* (Roxb.) Baker; see *F. macrophylla* (Willd.) O.Ktze. ex Merr.

F. congesta Ait. var. *semialata* (Roxb.) Baker; see *F. macrophylla* (Willd.) O.Ktze. ex Merr.

F. congesta Ait. var. *wightiana* (Wt. & Arn.) Baker; see *F. macrophylla* (Willd.) O.Ktze. ex Merr.

F. macrophylla (Willd.) O.Ktze. ex Merr. syn. *F. congesta* Ait., *F. congesta* Ait. var. *latifolia* (Roxb.) Baker, *F. congesta* Ait. var. *semialata* (Roxb.) Baker, *F. congesta* Ait. var. *wightiana* (Wt. & Arn.) Baker, *F. stricta* Roxb., *F. wallichii* Wt. & Arn., *F. rhodocarpa* Baker, *Moghania macrophylla* (Willd.) O.Ktze. (*Maughania*) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 323).

Synthesis of a chromenochalcone derivative - 2',5'-dihydroxy-2",2"-dimethyl-2H-pyrano(3',4':5",6") chalcone - and flemigin A monomethyl ether (*J. Nat. Prod.* 1993, *56,* 268).

F. procumbens Roxb. syn. *F. vestita* Benth. ex Baker

Khasi - Soh-phlang.

Isolation of genistein, daidzein, formononetin and pseudobaptigenin (*Fitoterapia* 1991, *62,* 458).

Distribution: Himalayas, from Himachal Pradesh to Nepal and Khasi Hills, ascending to 2900 m.

F. rhodocarpa Baker; see *F. macrophylla* (Willd.) O.Ktze. ex Merr.

F. stricta Roxb.; see *F. macrophylla* (Willd.) O.Ktze. ex Merr.

F. vestita Benth. ex Baker; see *F. procumbens* Roxb.

F. wallichii Wt. & Arn.; see *F. macrophylla* (Willd.) O.Ktze. ex Merr.

FLUEGGEA (Euphorbiaceae)

F. microcarpa Blume; see *Securinega virosa* (Roxb. ex Willd.) Baillon

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F. microcarpa (Roxb. ex Willd.) Baillon; see *Securinega virosa* (Roxb. ex Willd.) Baillon

F. virosa (Roxb. ex Willd.) Baillon; see *Securinega virosa* (Roxb. ex Willd.) Baillon

FOENICULUM (Apiaceae)

F. vulgare Mill. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 325).

p-Allylanisole, anethole, γ-cadinene, thujene, camphene, car-3-ene, p-cymene, duraldehyde, p-propylanisole, farnesene, fenchone, limonene, 1-methoxyethylbenzene, 1-(p-methoxyphenyl)-α-propanone, ocimene, β-phellandrene, α- and β-pinenes and trimethylbicycloheptanol constitute 95.2% of total volatile oil from Mienqien plant (*Lanzhou Daxue Xuebao, Ziran Kexuebao* 1989, *25,* 68; *Chem. Abstr.* 1990, *133,* 74832 w); petroselinic acid determined (6.0 to 8.3%) in seed oil by GC (*Rev. Fr. Corps Gras* 1991, *38,* 109; *Chem. Abstr.* 1991, *115,* 134503 t); limonene (57.8, 34.2 and 13.1) and trans-anethole (21.8, 41.2 and 63.4%) determined in oil from leaves, flowers and fruits respectively (*Zhiwu Xuebao* 1991, *33,* 82; *Chem. Abstr.* 1991, *115,* 189456 k); isolation of an antimutagenic flavonoid from fruits (Jpn. 3,215,434 (1991) Sep. 20; *Chem. Abstr.* 1991, *115,* 263454 b).

BIOLOGICAL ACTIVITY

Antimutagenic flavonoid prevented UV-induced mutation in *Escherichia coli* (Jpn. 3,215,434 (1991) Sep. 20; *Chem. Abstr.* 1991, *115,* 263454 b).

FORSYTHIA (Oleaceae)

F. viridissima Lindl. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Dehli, 1993, p. 299).

Acteoside identified as major component in leaves by HPLC (*Shoyakugaku Zasshi* 1992, *46,* 254; *Chem. Abstr.* 1993, *118,* 154257 f).

FRANCOEURIA (Asteraceae)

F. crispa Cass.; see *Pulicaria crispa* (Forsk.) Benth. & Hook.

FRITILLARIA (Liliaceae)

F. imperialis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 327).

Isolation and characterisation of a new steroidal alkaloid - ebeinone - from bulbs; eduardine, edpetilidine, verticinone and isoverticine also isolated (*Planta Med.* 1994, *60,* 377).

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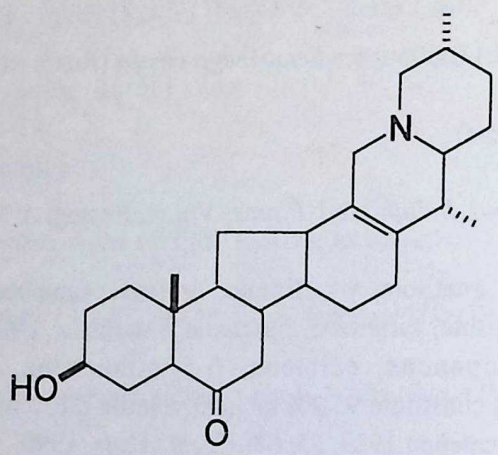
NEW COMPOUNDS



Ebeinone

BIOLOGICAL ACTIVITY

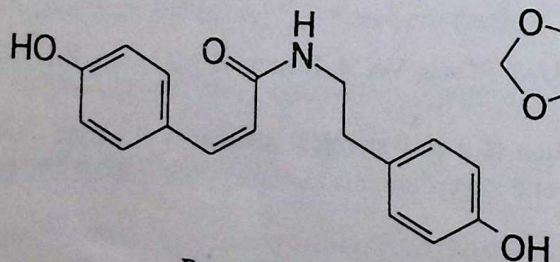
Ebeinone (1.0 μg/ml) exhibited anticholinergic activity (*Planta Med.* 1994, *60,* 377).

FUMARIA (Fumariaceae)

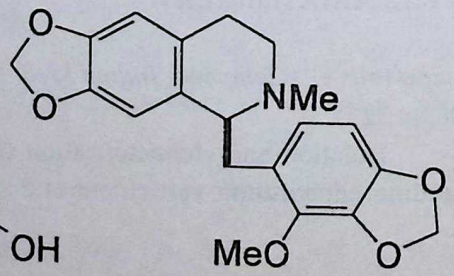
F. indica (Hassk.) Pugsley (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 328).

Isolation of a new phthalide isoquinoline alkaloid - (+)papraine - and its structure elucidation (*Heterocycles* 1989, *29,* 1091); a new benzylisoquinoline alkaloid - fumarizine - from Pakistani plant and its characterisation (*Fitoterapia* 1989, *60,* 552); isolation of new seco-phthalideisoquinoline alkaloid - papracine - and its structure determination; in addition, oxyhydrastinine, noroxyhydrastinine, fumaramine, stylopine, bisnorargemonine, β-hydrastine and fumaritine isolated; crystal structure of β-hydrastine determined (*Fitoterapia* 1992, *63,* 129); another seco-phthalide isoquinoline alkaloid - narlumicine - isolated from stems along with protopine, its nitrate, tetrahydrocoptisine and narlumidine and new compound characterised (*Phytochemistry* 1992, *31,* 2188); aerial parts afforded two new alkaloids - papracinine and paprazine - whose structures established; in addition, fumaritine N-oxide, parfumine, lastourvilline, feruloyltyramine, fumariflorine and N-methylcorydaldine isolated (*Phytochemistry* 1992, *31,* 2869).

NEW COMPOUNDS



Paprazine



Fumarizine

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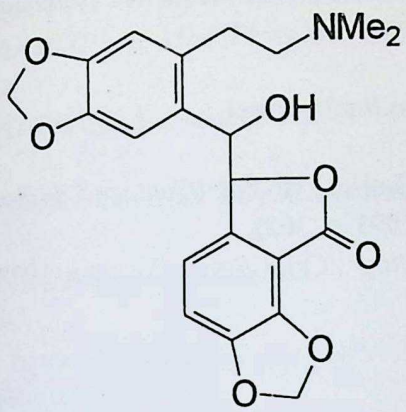
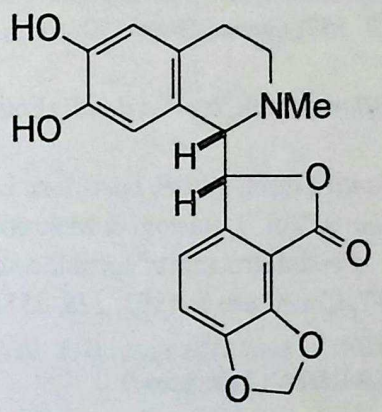
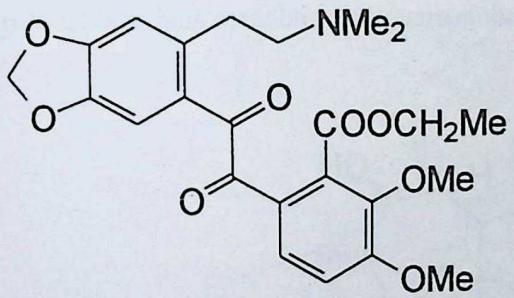


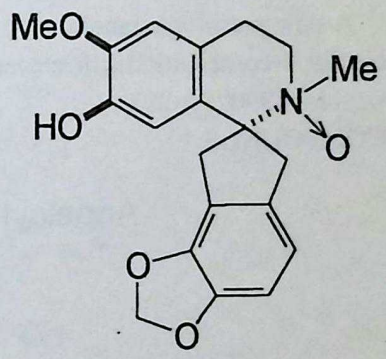
Narlumicine



(+) Papraine



Papracine



Papracinine

F. officinalis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 329).

Crystal structure of corydaline (*Acta Crystallogr., Cryst. Struct. Commun.* 1992, *48*C, 1864; *Chem. Abstr.* 1993, *118,* 22451 e); (–)caffeoyl-, (–)feruloyl- and (–)p-coumaroyl-D-malic acids isolated from flowering plant (*Planta Med.* 1993, *59,* 189).

F. parviflora Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 329).

Protopine and demethyl tetrahydroescholamine isolated from Egyptian plant (*Plant. Med. Phytother.* 1989, *23,* 109; *Chem. Abstr.* 1990, *112,* 191877 e).

BIOLOGICAL ACTIVITY

Ethanolic plant extract, protopine and demethyl tetrahydroescholamine significantly decreased intestinal muscle contractions and showed significantly cardio-inhibitory, antiarrhythmic, hypotensive and antipyretic effects (*Plant. Med. Phytother.* 1989, *23,* 109; *Chem. Abstr.* 1990, *112,* 191877 e); bulbocapnine produced dose-dependent inhibition of microsomal lipid peroxidation induced by Fe^{2+}/ ascorbate, CCl_4/NADPH or by Fe^{3+}ADP/ NADPH. Inhibition

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was more when CCl_4/NADPH or Fe^{3+}ADP/NADPH used as inducers (*Free Radical Res. Commun.* 1993, *18,* 157; *Chem. Abstr.* 1993, *119,* 195131 z).

F. parviflora Lamk. ssp. *vaillantii* (Loisel.) Hook.f.; see *F. vaillantii* Loisel.

F. vaillantii Loisel. syn. *F. parviflora* Lamk. ssp. *vaillantii* (Loisel.) Hook.f. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 302).

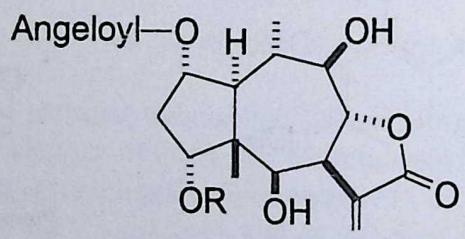
Crystal structure of egenine determined (*Acta Crystallogr., Cryst. Struc. Commun.* 1993, *49*C, 517; *Chem. Abstr.* 1993, *118,* 255165 e).

GAILLARDIA (Asteraceae)

G. pulchella Fouger (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 329).

A new pseudoguaianolide - pulchelloid D - isolated and its structure established; 4-epipulchellin, 4-epineopulchellin, eleven pseudoguaianolides and three guaianolides also isolated (*Heterocycles* 1990, *30,* 993).

NEW COMPOUNDS



Pulchelloid D

BIOLOGICAL ACTIVITY

Fifteen of above guaianolides and pseudoguaianolides, tested for cytotoxic activity against KB cells *in vitro,* showed ED50 0.47 to 21.5 μg/ml (*Heterocycles* 1990, *30,* 993).

GALIUM (Rubiaceae)

G. aparine L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 330).

Cholesterol, campesterol, stigmasterol, sitosterol, stigmasterol-7-ene, lanosterol, cycloartanol, cycloartenol and β-amyrin identified in samples collected in both spring and winter, whereas avenasterol-5-ene present only in winter sample and avenasterol-7-ene in spring sample; lauric, myristic, palmitic, palmitoleic, stearic, oleic, linoleic and linolenic acids identified in both samples (*Fitoterapia* 1990, *61,* 93); isolation of protopine from aerial parts (*J. Fac. Pharm. Gazi*

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Univ. 1991, *8,* 13; *Chem. Abstr.* 1991, *115,* 203348 k); chlorogenic acid, scopoletin and rutin isolated (*Plant. Med. Phytother.* 1993, *26,* 49; *Chem. Abstr.* 1994, *120,* 73467 p).

GALPHIMIA (Malpighiaceae)

G. glauca Cav.; see *Thryallis glauca* O. Kuntze

GARCINIA (Clusiaceae)

G. cowa Roxb. ex DC. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 332).

Isolation and structure elucidation of cowanin, cowanol, cowaxanthone, norcowanin and 1,3,6-trihydroxy-7-methoxy-2,5-bis-(3-methyl-2-butenyl)xanthone (I) (*Planta Med.* 1994, *60,* 365).

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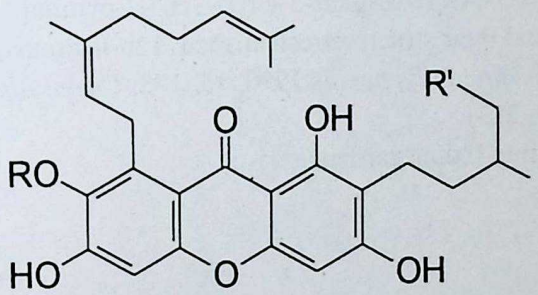
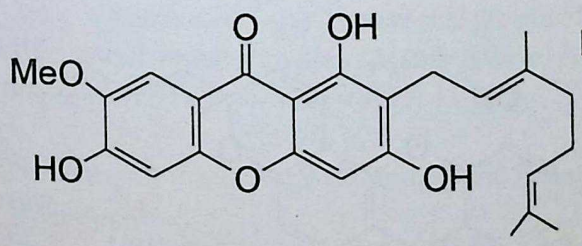
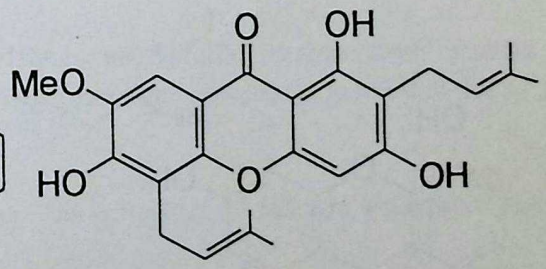


Cowanin
R = Me, R' = H
Cowanol
R = Me, R' = OH
Norcowanin
R,R' = H



Cowaxanthone



I

BIOLOGICAL ACTIVITY

Cowanol and cowaxanthone showed moderate antimicrobial activity against *Staphylococcus aureus* (*Planta Med.* 1994, *60,* 365).

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C. indica (Dupetit-Thouars) Chois. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 306).

Seeds contained neutral lipids (88.0) and glycolipids (4.0%); latter consisted of monogalactosyl diglyceride (19.3) and digalactosyl diglyceride (30.9); phosphatidyl-ethanolamine (75.4%) identified in phospholipid fraction; palmitic and stearic acids identified as major fatty acids in all lipid fractions (*J. Food Sci. Technol.* 1989, *26,* 322; *Chem. Abstr.* 1990, *112,* 234160 k; *J. Food Sci. Technol.* 1991, *28,* 195; *Chem. Abstr.* 1992, *116,* 104768 m); major fatty acids in seed oil were 18:0, 18:1 and 18:2 (*Asian J. Chem.* 1994, *6,* 720; *Chem. Abstr.* 1994, *121,* 175156 z).

G. livingstonei T. Anders.

Three new xanthones - garcilivins A, B and C - isolated from root bark and their structures established (*Phytochemistry* 1992, *31,* 3589); four new prenylated xanthones -1,4,5-trihydroxy-3(3-methylbut-2-enyl)xanthen-9-one (I), 6,11-dihydroxy-2,2-dimethylpyrano[3,2-c]xanthen-7(2H)-one (II), 4-(3',7'-dimethylocta-2',6'- dienyl)-1,3,5-trihydroxy-9H-xanthen-9-one (III) and 6,11-dihydroxy-3-methyl-3-(4-methylpent-3-enyl)-3H,7H-pyrano[2,3-c]xanthen-7-one (IV) isolated from root bark and their structures established; 12b-hydroxy-des-D-garcigerrin A also isolated (*Bull. Liaison-Groupe Polyphenols* 1990, *15,* 175; *Chem. Abstr.* 1991, *115,* 155034 f; *Phytochemistry* 1992, *31,* 313).

Distribution: Introduced into Indian gardens.

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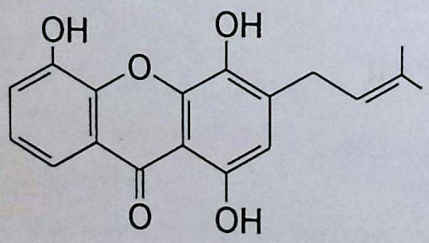

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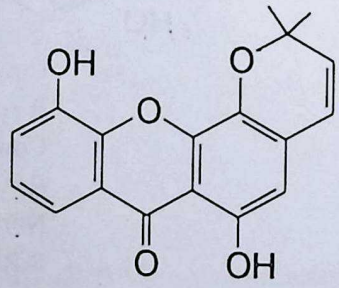

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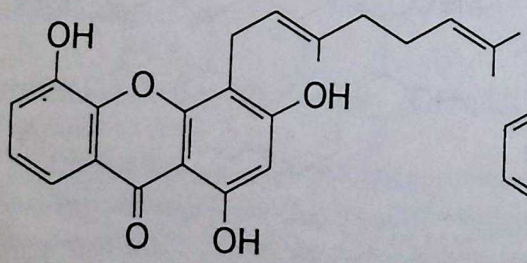

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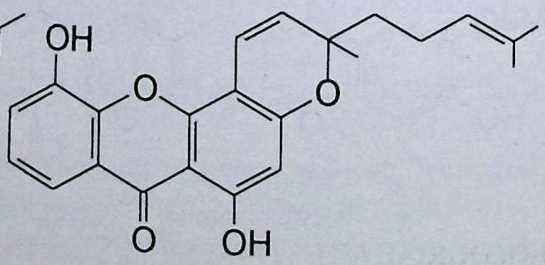

IV

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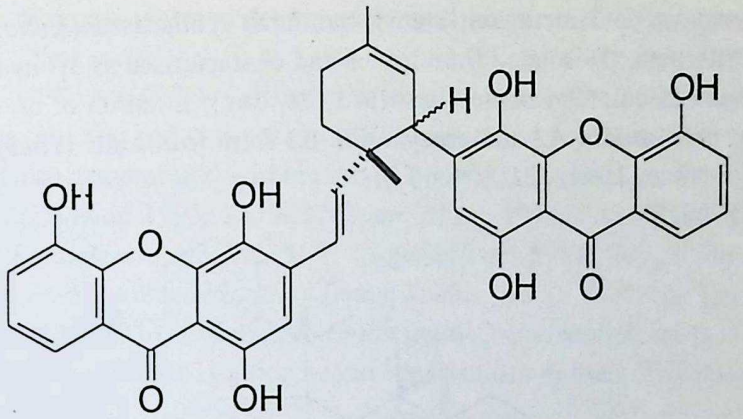
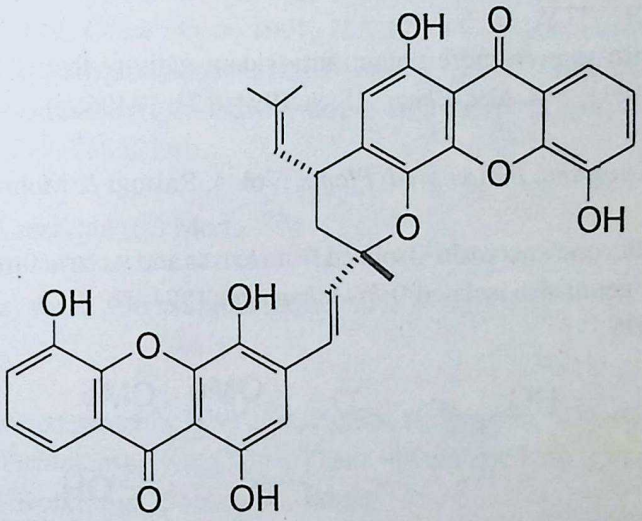


Garcilivin A

~~ = β

Garcilivin C

~~ = α



Garcilivin B

BIOLOGICAL ACTIVITY

Xanthones (I and II) prevented growth of fungus at 0.5 and 0.2 μg respectively. Xanthone (III) showed inhibitory activity against SW480 colon carcinoma cell line comparable to that of 5-fluorouracil (*Phytochemistry* 1992, *31,* 313).

G. mangostana L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 331).

Methanol extract of fruit hulls exhibited marked free radical scavenging activity (*Yakugaku Zasshi* 1994, *114,* 129; *Chem. Abstr.* 1994, *121,* 104066 j).

Leaves afforded cycloartenol, 9,19-cyclolanost-25-en-3β,24-diol, β-sitosterol, friedelin, betulin, mangiferadiol and mangiferolic acid (*Fitoterapia* 1990, *61,* 86); gartanin, 5-O-methylgartanin, 1-hydroxy-3,5,8-trimethoxy-2,4-di(3-methylbut-2-enyl)-xanthone and 1,5,8-

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trihydroxy-3-methoxy-2-(3-methylbut-2-enyl)-xanthone synthesised (*J. Nat. Prod.* 1990, *53*, 1463); a new triterpene (I) isolated from leaves and characterised as 3β-hydroxy-26-nor-9,19-cyclolanost-23-en-25-one (*Phytochemistry* 1991, *30*, 361); isolation of α- and γ-mangostins, (–)epicatechin, procyanidin A2 and procyanidin B2 from fruit hulls (*Yakugaku Zasshi* 1994, *114*, 129; *Chem. Abstr.* 1994, *121*, 104066 j).

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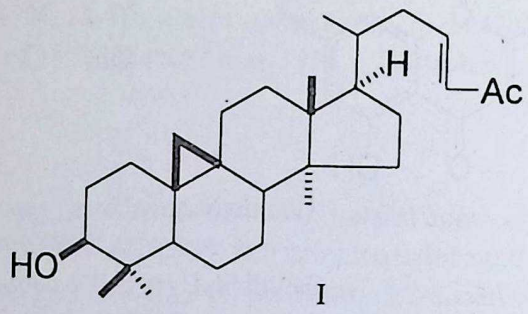

I

BIOLOGICAL ACTIVITY

γ-Mangostin showed more potent antioxidant activity than BHA and α-tocopherol (*Yakugaku Zasshi* 1994, *114*, 129; *Chem. Abstr.* 1994, *121*, 104066 j).

G. nervosa Miq. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 332).

A new isoflavone - nervosin - isolated from leaves and its structure determined; irigenin and 7-methyltectorigenin also isolated (*Phytochemistry* 1994, *36*, 807).

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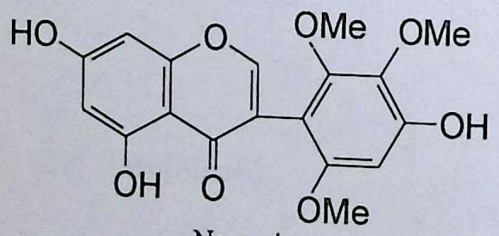

Nervosin

G. xanthochymus Hook.f. & T. Anders. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 307).

Isolation of friedelin, betulin, β-sitosterol, canophyllol, dimethyl terephthalate and an aliphatic C30 alcohol from dried leaves (*Fitoterapia* 1991, *62*, 286); leaves afforded agathisflavone, 7-O-methylamentoflavone and vitexin (*Fitoterapia* 1994, *65*, 89).

GARDENIA (Rubiaeae)

G. angusta (L.) Merr. syn. *G. jasminoides* Ellis, *G. florida* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 333).

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A new flavone isolated from stem and characterised as gardenin-5-O-β-D-glucopyranoside (*Natl. Acad. Sci. Lett.* 1988, *11,* 281; *Chem. Abstr.* 1990, *112,* 52247 m); two polysaccharides - GPS3 and GPS4 - isolated and partially characterised; GPS3 contained rhamnose, fucose, arabinose, glucose and galactose in molar ratio of 2.4:0.12:1.0:3.8:1.3; GPS4 contained these sugars and also galacturonic acid in ratio of 2.91:0.1:1.0:0.14:1.11:1.59 (*Shengwu Huaxue Yu Shengwu Wuli Xuebao* 1993, *25,* 301; *Chem. Abstr.* 1994, *120,* 73390 h; *Lanzhou Daxue Xuebao, Ziran Kexueban* 1993, *29,* 109; *Chem. Abstr.* 1994, *121,* 276698 h); one more polysaccharide - GPS5 - isolated (*Lanzhou Daxue Xuebao, Ziran Kexueban* 1993, *29,* 109; *Chem. Abstr.* 1994, *121,* 276698 h); isolation of (R)linalyl-6-O-α-L-arabinosyl-β-D-glucopyranoside and bornyl-6-O-β-D-xylosyl-β-D-glucopyranoside from flower buds (*Phytochemistry* 1994, *37,* 457).

BIOLOGICAL ACTIVITY

Polysaccharide fraction and polysaccharides GPS4 and GPS5 significantly inhibited *in vitro* cells of implanted tumor sarcoma 180 and ascite hepatoma (*Shengwu Huaxue Yu Shengwu Wuli Xuebao* 1993, *25,* 301; *Chem. Abstr.* 1994, *120,* 73390 h: *Lanzhou Daxue Xuebao, Ziran Kexueban* 1993, *29,* 109; *Chem. Abstr.* 1994, *121,* 276698 h); genipin and geniposide showed hypolipidaemic activity in hyperlipidaemic rats. Moreover, genipin lowered triglyceride and VLDL and it significantly decreased triglyceride synthesis in liver (*Toho Igakkai Zasshi* 1993, *40,* 16; *Chem. Abstr.* 1993, *119,* 108653 e).

G. florida L.; see *G. angusta* (L.) Merr.

G. jasminoides Ellis; see *G. angusta* (L.) Merr.

G. latifolia Ait.

Eng. - Boxwood gardenia; H. - Papra, Paphar, Banpindalu; Mar. - Ghogari, Papur, Pandru; Tel. - Peddabikki, Peddakaringuva, Gaiger; Tam. - Kumbay, Perungambil; Kan. - Kalkambi, Adavibikke; Oriya - Kotaranga, Damkurdu, Jantia.

Determination of methyl anthranilate (18.2), α-terpineol (7.5), linalool (6.23), styronyl acetate (3.02), α-pinene (2.6) and bornyl acetate (2.3%) in flower oil (*Indian Perfum.* 1989, *33,* 159; *Chem. Abstr.* 1990, *112,* 223110 t).

Distribution: Throughtout India in dry forests, ascending to 900 m.

G. lucida Roxb.; see *G. resinifera* Roth

G. resinifera Roth syn. *G. lucida* Roxb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 308).

β-Amyrin, β-sitosterol and oleic, linolenic, stearic and palmitic acids identified in lipid fraction of bark (*Acta Cienc. Indica, Chem.* 1990, *16,* 171; *Chem. Abstr.* 1992, *116,* 124868 x); a steroidal saponin isolated from stem bark and characterised as β-sitosterol-3-O-β-D-

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glucosyl(1→4)-O-α-L-rhamnopyranoside (*Acta Cienc. Indica, Chem.* 1990, *16,* 225; *Chem. Abstr.* 1992, *116,* 148176 w).

GARUGA (Burseraceae)

G. floribunda Decne. var. *gamblei* (King & Smith) Kalkman syn. *G. gamblei* King & Smith (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 334).

^{13}C-NMR spectra of garuganin III, garugamblin 1 and garugamblin 2 (*Magn. Reson. Chem.* 1989, *27,* 635; *Chem. Abstr.* 1990, *112,* 20843 m); crystal structures of garugamblin 1 and garugamblin 2 established (*Acta Crystallogr., Cryst. Struct. Commun.* 1990, *46*C, 307; *Chem. Abstr.* 1990, *113,* 97305 r); synthesis of garugamblin 2 (*Ann. Chem.* 1994, 361).

G. gamblei King & Smith; see *G. floribunda* Decne. var. *gamblei* (King & Smith) Kalkman

G. pinnata Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 334).

Stem bark extract showed coagulatory and spasmolytic activities (*J. Nepal Chem. Soc.* 1990, *9,* 16; *Chem. Abstr.* 1992, *116,* 124861 q).

Isolation of octanedioic acid-2-ethyl-bis(2-ethylhexyl)ester from stem bark (*J. Nepal Chem. Soc.* 1990, *9,* 16; *Chem. Abstr.* 1992, *116,* 124861 q); a new euphane-type alcohol isolated from stem bark and characterised as 13α,14β,17α-lanosta-7, 24-dien-1β,3β-diol (*Phytochemistry* 1992, *32,* 161); Z-isomer of garugamblin 1 synthesised which spontaneously isomerised to E isomer (garugamblin 1) (*Tetrahedron* 1993, *49,* 4893); three new diaryl heptanoids - garuganin IV, garuganin V and garuganin VI - isolated from stem bark and their structures elucidated (*Phytochemistry* 1993, *33,* 1221); isolation and structure determination of 13α,14β,17α-lanosta-7,24-dien-3β,11β,16α-triol from stem bark (*Phytochemistry* 1994, *36,* 417).

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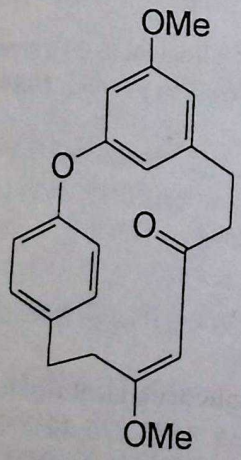
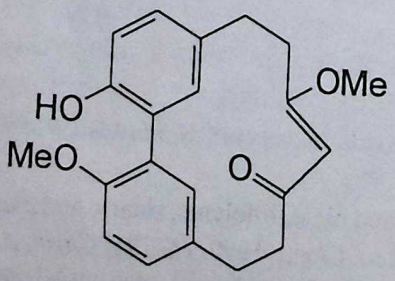
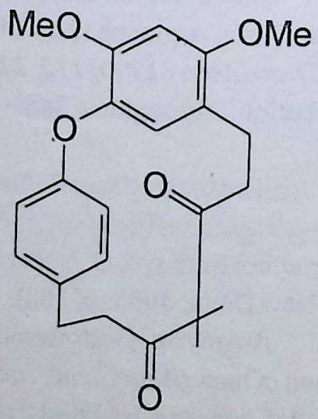


Garuganin IV



Garuganin V



Garuganin VI

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GELONIUM (Euphorbiaceae)

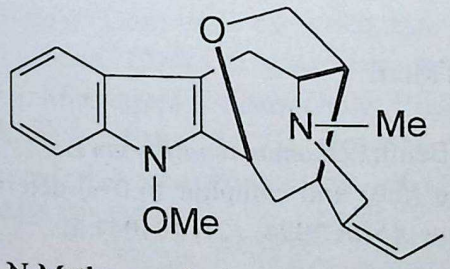
G. multiflorum Juss.; see *Suregada multiflora* (Juss.) Baill.

GELSEMIUM (Loganiaceae)

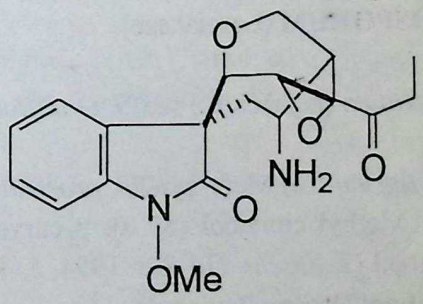
G. elegans (Gardn. & Champ.) Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 335).

Isolation of a new alkaloid - N-methoxy-anhydrovobasinediol - from whole plant and its crystal structure determination (*Phytochemistry* 1989, *28,* 2827); two new indole alkaloids - 19(R)kouminol and 19(S)kouminol - isolated and their structures elucidated (*J. Nat. Prod.* 1989, *52,* 1180); koumine and koumidine synthesised (*Heterocycles* 1990, *30,* 325; *J. Am. Chem. Soc.* 1990, *112,* 5220; *Tetrahedron Lett.* 1991, *32,* 3895); crystal structure of (+)koumine determined; dihydrokoumine isolated from roots (*Yingyong Huaxue* 1990, *7,* 27; *Chem. Abstr.* 1991, *114,* 62455 h; *Chinese Chem. Lett.* 1991, *2,* 365; *Chem. Abstr.* 1991, *115,* 136467 h); isolation of two new koumine-related alkaloids - 19(R)-hydroxydihydrokoumine and 19(S)-hydroxydihydrokoumine - and their stereostructure elucidation (*Phytochemistry* 1990, *29,* 965); two new oxindole alkaloids - gelselegine and 11-methoxy-19(R)-hydroxygelselegine - isolated and their crystal structures determined (*Phytochemistry* 1990, *29,* 3013); isolation of 19(R)-hydroxydihydrogelsevirine, 19(S)-hydroxydihydrogelsevirine and gelsevirine (*Phytochemistry* 1991, *30,* 679); isolation and crystal structure elucidation of another four new oxindole alkaloids, 20-hydroxydihydrorankinidine, N-desmethoxyhumantenine, 15-hydroxyhumantenine and gelsemoxonine (*Phytochemistry* 1991, *30,* 1311); synthesis of gelsemine (*Chem. Commun.* 1994, 763, 767).

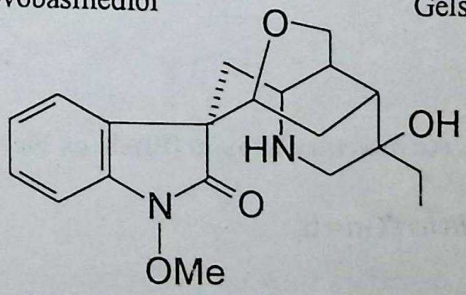
NEW COMPOUNDS



N-Methoxy-anhydrovobasinediol



Gelsemoxonine



20-Hydroxydihydrorankinidine

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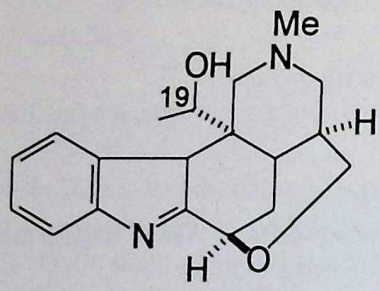
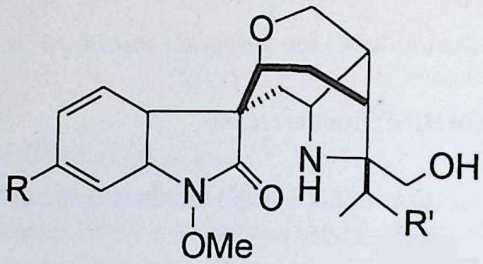
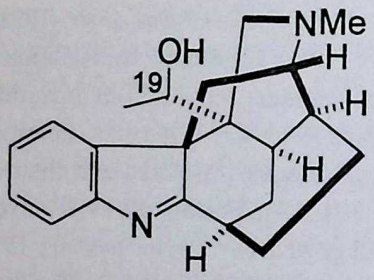


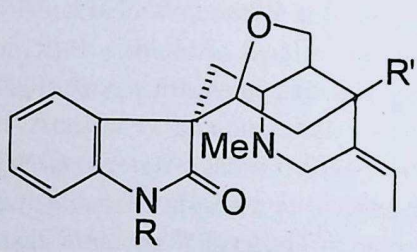
19(R)Kouminol
19(S)Kouminol



Gelselegine
R,R' = H
11-Methoxy-19(R)-hydroxygelselegine
R = OMe, R' = OH



19(R)-Hydroxydihydrokoumine
19(S)-Hydroxydihydrokoumine



N-Desmethoxyhumantenine
R,R' = H
15-Hydroxyhumantenine
R = OMe, R' = OH

GENIOSPORUM (Lamiaceae)

G. prostratum (L.) Benth.; see *G. tenuiflorum* (L.) Merr.

G. tenuiflorum (L.) Merr. syn. *G. prostratum* (L.) Benth., *Ocimum tenuiflorum* L.

Methyl chavicol (87.0), β-caryophyllene (5.0) and camphor (4.0%) determined in essential oil (*J. Essent. Oil Res.* 1994, *5*, 459; *Chem. Abstr.* 1994, *121*, 104044 a).
Distribution: Deccan Peninsula.

GENTIANA (Gentianaceae)

G. chirayita Roxb. ex Flem.; see *Swertia chirayita* (Roxb. ex Flem.) Kars.

G. dahurica Fisch.; see *G. olivieri* Griseb.

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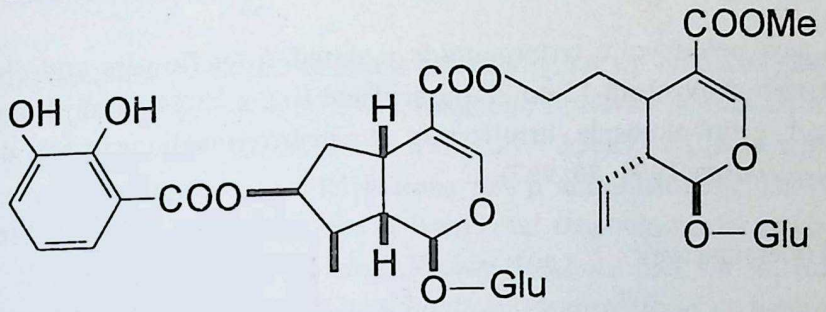
G. depressa D.Don (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 337).

A new seco-iridoid glycoside - depresteroside - isolated and its structure established as 7-(2,3-dihydroxybenzoyl)-11-(7-secologanoloxy)loganoyl ester (*Phytochemistry* 1994, *36,* 377).

NEW COMPOUNDS



Depresteroside

G. kurroo Royle (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 124).

Catalpol, its 6'-cinnamoyl, 6-O-cinnamoyl, 6-O-vanilloyl and 6-O-feruloyl derivatives and aucubin isolated from roots and rhizomes (*Alexandria J. Pharm. Sci.* 1991, *5,* 82; *Chem. Abstr.* 1991, *115,* 228366 c).

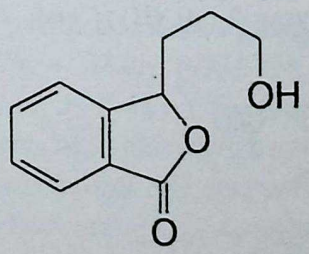
G. olivieri Griseb. syn. *G. dahurica* Fisch. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Dehli, 1991, p. 338).

Isolation of isoorientin and its 4'-O-glucoside and 7-O-glucoside and orientin-2"-O-glucoside (*Hacettepe Univ. Eczacilik Fak. Derg.* 1991, *11,* 29; *Chem. Abstr.* 1992, *116,* 191079 d).

G. pedicellata (D.Don) Wall. ex Griseb. syn. *G. quadrifaria* sensu Clarke, p.p., *G. quadrifaria* Clarke var. *pilosula* Clarke, *G. squarrosa* sensu Clarke, p.p. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 338).

A new phthalide (I) isolated from flowers and characterised as 3-(3-hydroxypropyl)phthalide (*Planta Med.* 1989, *55,* 405).

NEW COMPOUNDS



I

G. quadrifaria Clarke; see *G. pedicellata* (D.Don) Wall. ex Griseb.

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G. quadrifaria Clarke var. *pilosula* Clarke; see *G. pedicellata* (D.Don) Wall. ex Griseb.

G. squarrosa Clarke; see *G. pedicellata* (D.Don) Wall. ex Griseb.

G. tibetica King (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 340).

Two new pentacyclic triterpenoids isolated from flowers and characterised as 1α,2α,3β,24-tetrahydroxyolean-12-en-28-oic acid and 1α,2α,3β,24-tetrahydroxyurs-12,20(30)-dien-28-oic acid; gentiopicroside, ursolic acid, 2α-hydroxyursolic acid and daucosterol also isolated (*Phytochemistry* 1994, *36,* 997).

GERANIUM (Geraniaceae)

G. robertianum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 339).

Aerial parts afforded rutin, nicotiflorin, hyperoside, quercimeritrin, spireoside, astragalin, quercitrin, isoquercitrin, quercetin-rhamnogalactoside, quercetin-3-O-rhamnoglucoside, kaempferol-3-O-rhamnogalactoside, kaempferol-3-O-rhamnoglucoside and kaempferol-3-O-glucorhamnoside (*Planta Med.* 1991, *57,* 292); determination of linalool (22.9), γ-terpinene (13.9), germacrene D (7.8), limonene (5.3), geraniol (4.4), α-terpineol (3.8) and phytol (3.8%) in essential oil by GC-MS (*Flavour Fragrance J.* 1992, *7,* 223; *Chem. Abstr.* 1992, *117,* 257944 m).

GERBERA (Asteraceae)

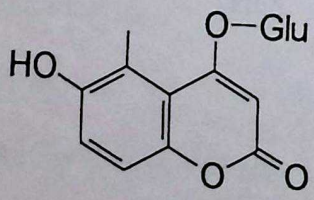
G. gossypina (Royle) Beauv. syn. *G. lanuginosa* (Wall. ex DC.) Benth. & Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 339).

Daphnetin 7-methyl ether and scopoletin isolated (*Indian J. Chem.* 1991, *30*B, 714).

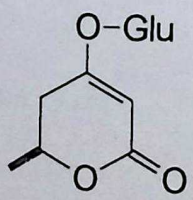
G. jamesonii Bolus ex Gard. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Dehli, 1995, p. 339).

Two new glycosides isolated from aerial parts of hybrid variety and characterised as 4β-glucopyranosyloxy-6-hydroxy-5-methylcoumarin (I) and 6(S)5,6-dihydro-4β-D-glucopyranosyloxy-6-methyl-2H-pyran-2-one (II) (*Chem. Pharm. Bull.* 1989, *32,* 2621).

NEW COMPOUNDS



I



II

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G. lanuginosa (Wall. ex DC.) Benth. & Hook.f.; see *G. gossypina* (Royle) Beauv.

GINKGO (Ginkgoaceae)

G. biloba L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 340).

Administration of leaf extract to awake rats (0.15 g/kg, i.p.) reduced glucose utilization in different regions of brain by 3.0 to 26.0%. Ginkgolide B, however, showed no such activity (*Drug Dev. Res.* 1991, *23,* 219; *Chem. Abstr.* 1991, *115,* 150277 c); plant extract had direct excitatory effect on lateral vestibular nuclei neurons; its i.p. administration in normal guinea pig caused reversible, dose-dependent decrease of horizontal vestibulo-ocular reflex gain without affecting phase of reflex (*Pharmacol. Biochem. Behav.* 1992, *42,* 595; *Chem. Abstr.* 1992, *117,* 124394 t); pretreatment of rats with plant extract reduced electroretinogram b-wave duration and b-wave peak delay induced by chloroquine administration (*Int. Congr. Ser.-Excerpta Med.* 1992, 761; *Chem. Abstr.* 1993, *119,* 62470 m); leaf extract shortened sleeping time induced in mice by anaesthetics (hexobarbital, α-chlorolose and urethane, i.p.) (*Biol. Pharm. Bull.* 1993, *16,* 210; *Chem. Abstr.* 1993, *119,* 19967 t); leaf extract reduced Ca^{2+}-induced increase in oxidative metabolism of rat brain neurons (*Jap. J. Pharmacol.* 1993, *61,* 367); plant extract possesed free radical scavenging activity which may be responsible for its efficacy in treatment of free radicals-induced cerebral insufficiencies (*Int. Congr. Ser.-Excerpta Med.* 1994, 1058; *Chem. Abstr.* 1994, *121,* 292708 s).

1D and 2D NMR study of ginkgolides A, B and C (*Spectrochim. Acta* 1990, *45*A, 1037; *Chem. Abstr.* 1990, *112,* 139608 d); leaves afforded rutin, isorhamnetin-3-O-rutinoside, kaempferol-3-O-rutinoside, kaempferol-3-O-(6''''-p-coumaroyl)glucosyl(1→4)-rhamnoside and quercetin-3-O-(6''''-p-coumaroyl)glucosyl(1→4)-rhamnoside (*Shenyang Yaoxueyuan Xuebao* 1989, *6,* 284; *Chem. Abstr.* 1990, *113,* 148926 d); isolation and structure elucidation of 3-O-α-[(6'''-p-coumaroyl)glucosyl(1→2)]-rhamnosides of kaempferol and quercetin from leaves (*Arch. Pharmacal Res.* 1990, *13,* 207; *Chem. Abstr.* 1991, *114,* 139731 e); water-soluble polysaccharides isolated from leaves and their partial structures established (*Phytochemistry* 1991, *30,* 3017); sciadopitysin obtained from leaves (*Shenyang Yaoxueyuan Xuebao* 1991, *8,* 124; *Chem. Abstr.* 1991, *115,* 179326 d); flavonoid (3.2), rutin (0.72) and quercetin (0.003%) determined in leaves and their extraction process developed (*Zhongcaoyao* 1992, *23,* 122; *Chem. Abstr.* 1992, *117,* 66642 b); bilobalide, ginkgolide A, ginkgolide B and ginkgolide C identified in leaves (*Zhiwu Ziyuan Yu Huanjing* 1992, *1,* 58; *Chem. Abstr.* 1993, *118,* 3885 h; *Pharm. Pharmacol. Lett.* 1992, *2,* 187; *Chem. Abstr.* 1993, *118,* 219941 w); five new flavonol glycosides isolated from leaves and characterised as kaempferol-3-[2''-glucosyl]rhamnoside (I), kaempferol-3-[2'',6'''-{p-(7''''-glucosyl)coumaroyl}glucosyl]rhamnoside (II), quercetin-3-[2''-glucosyl]rhamnoside (III), quercetin-3-[2'',6'''-{p-(7''''-glucosyl)coumaroyl}glucosyl]rhamnoside (IV) and quercetin-3-[2'',6'''-(p-coumaroyl)glucosyl]rhamnosyl-7-glucoside (V) (*Phytochemistry* 1992, *31,* 1391);

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a toxic compound - 4-O-methylpyridoxine - responsible for food poisoning isolated from seeds (*Biol. Pharm. Bull.* 1993, *16,* 210; *Chem. Abstr.* 1993, *119,* 19967 t); a new flavone glycoside isolated from leaves and characterised as kaempferol-3-O-β-D-glucosyl(1→2)-α-L-rhamnopyranoside; DL-threo-p-hydroxyphenylglycerol and DL-threo-guaiacylglycerol isolated (*RIST Yongu Nonmum* 1994, *8,* 105; *Chem. Abstr.* 1994, *121,* 17799 g); new optically active 8-hydroxy-3-alk(en)yl-3,4-dihydroisocoumarins isolated from fruits and synthesised; their absolute configurations determined to be R (*Tetrahedron Lett.* 1994, *35,* 3949).

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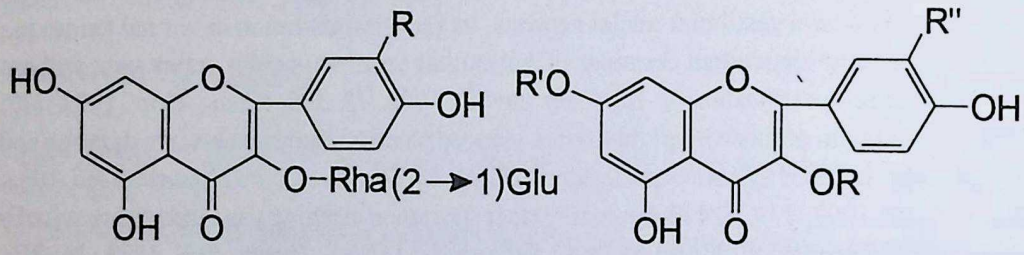

I
R = H
III
R = OH

II
R = X-[6-p-(glucosyl)coumaroyl],
R',R'' = H
IV
R = X-[6-p-(glucosyl)coumaroyl],
R' = H, R'' = OH
V
R = X-(6-p-coumaroyl), R' = Glu,
R'' = OH

X = Rha(2→1)Glu

BIOLOGICAL ACTIVITY

Bilobetin markedly inhibited tetradecanoylphorbol acetate-induced Epstein-Barr virus-early antigen expression indicating that it inactivates virus genome and thus can be used as anticancer and antiviral agent (Jpn. 1,42,426 (1989) Feb. 14; *Chem. Abstr.* 1990, *112,* 16256 e). bilobalide and ginkgolide significantly shortened sleeping time induced by anaesthetics (*Biol. Pharm. Bull.* 1993, *16,* 210; *Chem. Abstr.* 1993, *119,* 19967 t).

GLINUS (Ficoidaceae)

G. lotoides L. syn. *Mollugo lotoides* (L.) Kuntze, *M. hitra* Thunb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 313).

A new triterpenoid sapogenin - mollugogenol G - isolated and its stereostructure established (*J. Indian Chem. Soc.* 1989, *66,* 64).

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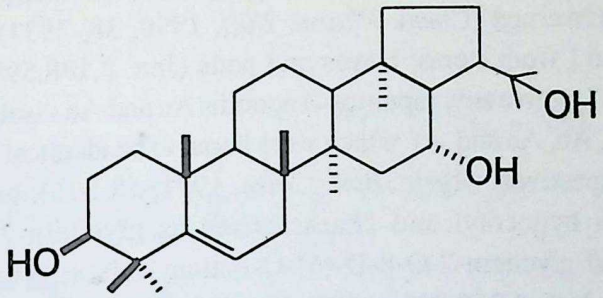

Mollugogenol G

GLIRICIDIA (Papilionaceae)

G. maculata (H.B. & K.) Steud.; see *G. sepium* (Jacq.) Kunth ex Walp.

G. sepium (Jacq.) Kunth ex Walp. syn. *G. maculata* (H.B. & K.) Steud. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 344).

Octacosan-1-al and hexacosan-1-al isolated from leaves whereas heptacosane obtained from petioles (*Orient. J. Chem.* 1993, *9,* 143; *Chem. Abstr.* 1994, *120,* 294167 t).

GLORIOSA (Liliaceae)

G. superba L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 314).

Colchicine (0.9%) identified in corm extract, its level being highest at beginning of growth and declining as growth proceeds (*J. Plant Physiol.* 1991, *138,* 691; *Chem. Abstr.* 1992, *116,* 37966 j); isolation and structure elucidation of a new alkaloid - 1,2-didemethyl colchicine - from seeds; colchicine, 2,3-didemethylcolchicine, 3-demethylcolchicine, N-formyl-N-deacetyl-colchicine and colchicoside also isolated (*J. Nat. Prod.* 1993, *56,* 1174).

GLYCINE (Papilionaceae)

G. hispida Maxim.; see *G. max* (L.) Merr.

G. max (L.) Merr. syn. *G. soja* sensu Hook.f. (non Sieb. & Zucc.), *Soja hispida* Moench, *Glycine hispida* Maxim. (*Compend. Indian Med. Plants.,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 345).

Soyasaponins A3, A4, A5, A6 and V and acetyl soyasaponins A1, A2, A3, A4, A5 and A6 isolated from buds (Jpn. 1,66,196 (1989) Mar. 19; *Chem. Abstr.* 1990, *112,* 84153 u); daidzein, genistin and glycitein-7-O-glucoside isolated from defatted soybean flour (*Dev. Food. Sci.* 1990, *25,* 267; *Chem. Abstr.* 1991, *115,* 70120 f); N^6-methylagmatine identified in seeds and seedlings

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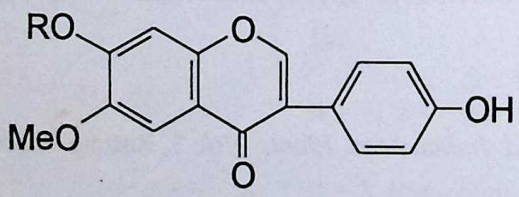
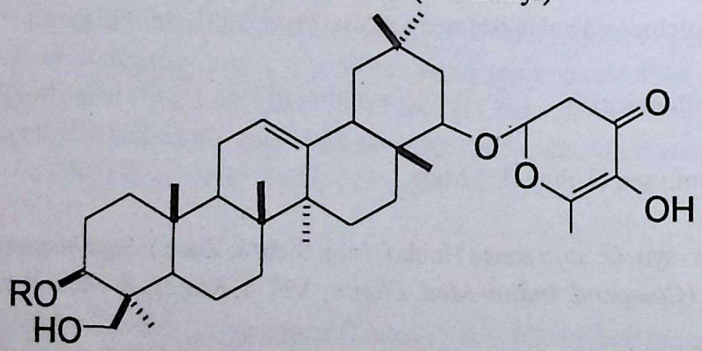
(*Phytochemistry* 1990, *29,* 1313); two glycosphingolipids - soyacerebrosides I and II - isolated and their structures determined (*Chem. Pharm. Bull.* 1990, *38,* 2933); process developed for isolation of soyasaponin I from stems, leaves and pods (Jpn. 2,188,598 (1990) Jul. 24; *Chem. Abstr.* 1990, *113,* 218227 c); two new saponins - saponins Ac and Ad - isolated from seed hypocotyl along with saponins Aa, Ab, Ae and Af which were found to be identical with acetylsoyasaponins A4, A1, A5 and A2 respectively (*Agric. Biol. Chem.* 1991, *55,* 315); two isoflavone glycosides isolated from soybean hypocotyl and characterised as glycitein-7-O-β-D-(6"-O-acetyl)-glucopyranoside (I) and glycitein-7-O-β-D-(6"-O-malonyl)glucopyranoside (II) (*Agric. Biol. Chem.* 1991, *55,* 859; Jpn. 4,266,898 (1992) Sep. 22; *Chem. Abstr.* 1993, *118,* 36138 v); phosphatidylethanolamine, phosphatidylcholine, phosphatidylinositol, lysophosphatidylcholine and phosphatidic acid identified by HPLC (*Senyang Yaoxueyuan Xuebao* 1991, *8,* 164; *Chem. Abstr.* 1992, *116,* 46407 e); isolation of malonylgenistin and malonyldaidzin (*ACS Symp. Ser.* 1992, *507,* 98; *Chem. Abstr.* 1993, *118,* 100624 e); isolation and structure elucidation of saponin BeA (soyasaponin VI) (*Biosci., Biotechnol., Biochem.* 1992, *56,* 142; *Chem. Abstr.* 1992, *117,* 208876 g; *J. Nat. Prod.* 1992, *55,* 1339; Jpn. 5,178,879 (1993) Jul. 20; *Chem. Abstr.* 1993, *119,* 222038 h); one more glycoside of soyasapogenol B (III) isolated from hypocotyl (Jpn. 5,178,879 (1993) Jul. 20; *Chem. Abstr.* 1993, *119,* 222038 h).

NEW COMPOUNDS



I
R = Glu(6-Ac)
II
R = Glu(6-Malonyl)



III
R = Gluc.acid(2→1)Gal(2→1)Glu
Saponin BeA
R = Gluc.acid(2→1)Gal(2→1)Rha

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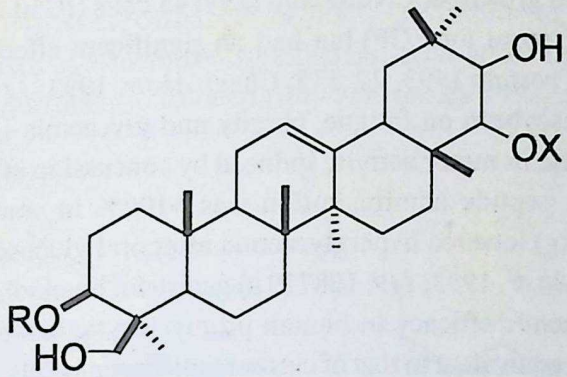

X = Ara(3→1)Glu(2',3',4',6'-tetraacetyl)
Saponin Ac
R = Gluc.acid(2→1)Gal(2→1)Rha
Saponin Ad
R = Gluc.acid(2→1)Ara(2→1)Glu

BIOLOGICAL ACTIVITY

Acetylsoyasaponins A1, A2, A3, A4, A5 and A6 stimulated gastric secretion whereas soyasaponins A3, A4, A5, A6 and V were effective in controlling lipid oxide formation (Jpn. 1,66,196 (1989) Mar. 19; *Chem. Abstr.* 1990, *112,* 84153 u); soyacerebroside II exhibited ionophoretic activity for Ca^{2+} ion in human erythrocyte membrane (*Chem. Pharm. Bull.* 1990, *38,* 2933); soyasaponin I useful for inhibiting lipid oxidation and formation of renal calculus and for treatment of CCl_4-induced liver disorders (Jpn. 2,188,598 (1990) Jul. 24; *Chem. Abstr.* 1990, *113,* 218227 c); pretreatment of isolated rat hepatocytes with glycyrrhizin, crude soyasaponin and three soyasaponin fractions (SS-A, SS-B and SS-AB) suppressed release of alanine transaminase from hepatocyte challenged with anti-rat hepatocyte membrane antiserum, thereby demonstrating their preventive effect on *in vitro* immunological liver injury (*Igaku to Seibutsugaku* 1992, *124,* 57; *Chem. Abstr.* 1992, *117,* 143380 u); oral and i.p. administration of total soyasaponins inhibited growth of S180 cells in tumor-bearing mice *in vivo*; total soyasaponins inhibited DNA synthesis in S180 cells and YAC-1 cells *in vitro*, and also showed marked cytotoxic action on K562 and YAC-1 cells (*Baiqiuen Yike Daxue Xuebao* 1992, *18,* 333; *Chem. Abstr.* 1993, *118,* 93910 q); malonylgenistin and malonyldaidzin showed antioxidant action in chicken fat, chicken olein and also inhibited oxidation of linoleic acid in presence of β-carotene subjected to irradiation with UV light (*ACS. Symp. Ser.* 1992, *507,* 98; *Chem. Abstr.* 1993, *118,* 100624 e); oxidation index and oxidation rate of α-tocopherol-containing phosphatidylcholine liposomes decreased markedly in presence of soyasaponin compared to those of pure phospholipid liposomes. α-Tocopherol delayed oxidation of liposomes and soyasaponin stimulated antioxidant activity of α-tocopherol in liposomes (*Han'guk Yongyang Siklyong Hakhoechi* 1992, *21,* 381; *Chem. Abstr.* 1993, *118,* 146413 p).

Effect of genistein and daidzein on growth of LNCaP and DV-145 (human prostate cancer) cell lines studied. Genistein, but not daidzein, inhibited both serum and epidermal growth

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factor (EGF)-stimulated growth of LNCaP and DV-145 cells (IC50 values 8.0 to 27.0 μg/ml for serum and 4.3 to 15.0 μg/ml for EGF) but had no significant effect on EGF receptor tyrosine autophosphorylation (*Prostate* 1993, *22,* 335; *Chem. Abstr.* 1993, *119,* 131051 r); effect of small peptides derived from soybean on fatigue, obesity and glycaemia in mice investigated. These delayed for 3 hr decrease in motor activity induced by concussion stress. Recovery from fatique in 60 min after small peptide administration was >100% in comparison with controls. Its administration (1.0 g/kg) lowered hyperglycaemia after oral glucose loading (*Yakugaku Zasshi* 1993, *113,* 334; *Chem. Abstr.* 1993, *119,* 108779 a) genistein, hinokiol, matairesinol and arctigenin showed high antileukaemic efficacy in human promyelocytic leukaemic cell line HI-60, IC50 less than 0.1 μg/ml and equivalent to that of current anticancer agents. Genistein was also effective against growth of human T lymphocytic leukaemia cell line MOLT-4 and strongly suppressed incorporation of [^{3}H]thymidine, [^{3}H]uridine and [^{3}H]leucine into HL-60 cells (*Life Sci.* 1994, *55,* 1061).

G. soja Sieb. & Zucc.; see *G. max* (L.) Merr.

GLYCOSMIS (Rutaceae)

G. citrifolia (Willd.) Lindl. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 317).

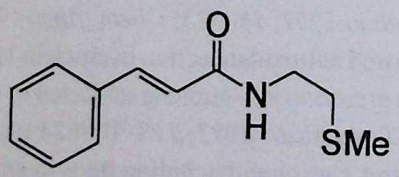
Glyfoline synthesised (*Tetrahedron Lett.* 1991, *32,* 1541).

G. cyanocarpa Spreng.

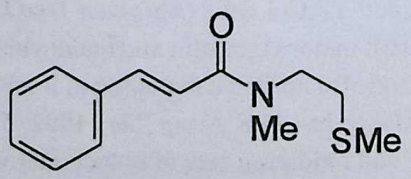
Isolation of evolitrine, acrovestone, xylotenin, β-sitosterol and epitaraxasterol from root bark (*Indian J. Chem.* 1992, *31*B, 133); two new sulphur-containing cinnamides - sinharine and methylsinharine - isolated from leaves and their structures elucidated; in addition kokusaginine, skimmianine and glycozolidol isolated (*Tetrahedron* 1992, *48,* 1209).

Distribution: Native of Java, introduced into Indian gardens.

NEW COMPOUNDS



Sinharine



Methylsinharine

G. mauritiana (Lamk.) Tanaka syn. *G. pentaphylla* sensu Hook.f., p.p (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 318).

Isolation of two new carbazole alkaloids - glycomaurine and glycomaurrol - from bark and their structure determination; noracronycine and des-N-methylacronycine also isolated (*Aust.*

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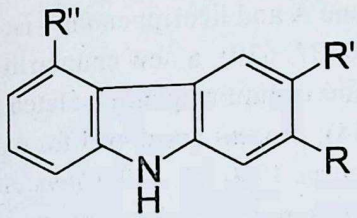
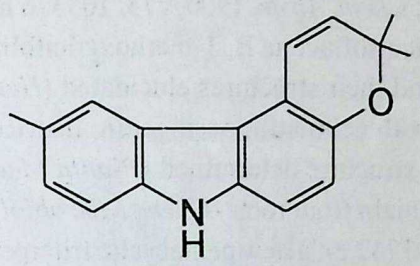
J. Chem. 1989, *42,* 1375); two new carbazole alkaloids - glycozolicine and glycosinine - isolated from roots and characterised as 5-methoxy-3-methylcarbazole and 2-methoxy-3-formylcarbazole respectively; 3-formylcarbazole also isolated (*Phytochemistry* 1992, *31,* 2503).

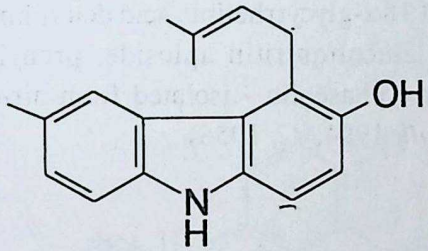
NEW COMPOUNDS





Glycozolicine
R = H, R' = Me, R'' = OMe
Glycosinine
R = OMe, R' = CHO, R'' = H

Glycomaurin



Glycomaurrol

G. pentaphylla Hook.f.; see *G. mauritiana* (Lamk.) Tanaka

GLYCYRRHIZA (Papilionaceae)

G. glabra L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 348).

Plant extract which contained flavonoids inhibited melanogenesis in dose-dependent manner as assayed by uptake of ^{14}C-thiouracil by B-16 melanoma cells; extract-treated melanoma cells showed decrease in activities of T1 and T3 tyrosinase; melanocytes from human skin incubated with extract were found to be dopa-negative. These results indicate that extract inhibits tyrosinase activity *in vitro* (*Nippon Hifuka Gakkai Zasshi* 1992, *102,* 679; *Chem. Abstr.* 1992, *117,* 143385 z); depigmentation of UVB- and psoralen-UVB-induced brownish pigmentation of guinea pig skin was observed and epidermal melanin granules and dopa-positive cells were reduced by licorice extract containing flavonoids. Similar results obtained with human skin (*Nippon Hifuka Gakkai Zasshi* 1992, *102,* 689; *Chem. Abstr.* 1992, *117,* 143386 a); licorice extract after removal of glycyrrhizin, showed immunostimulant activity (Jpn. 5,262,658 (1993) Oct. 12; *Chem. Abstr.* 1994, *120,* 38128 g).

Isolation and structure determination of licopyranocoumarin, licoarylcoumarin and

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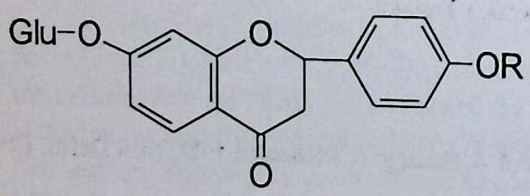
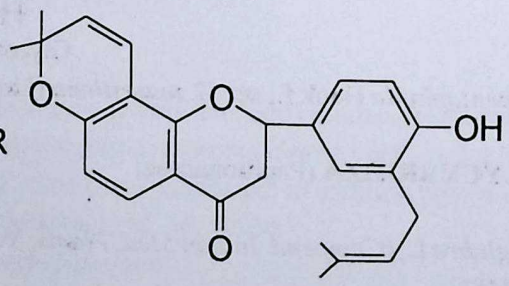
glisoflavone; kaempferol 3-O-methyl ether and licocoumarone also isolated (*Chem. Pharm. Bull.* 1989, *37,* 3005); roots afforded liquiritigenin, isoliquiritigenin, liquiritin and isoliquiritin (Jpn. 1,175,942 (1989) Jul. 12; *Chem. Abstr.* 1990, *112,* 164941 q); process developed for isolation of yellow pigment containing glycyrrhetinic acid and flavone from roots (CN 1,033,459 (1989) Jun. 21; *Chem. Abstr.* 1990, *113,* 103376 h); four new isoprenoid-substituted phenolic constituents - semilicoisoflavone B, 1-methoxyficifolinol, isoangustone A and licoriphenone - isolated from roots and their structures elucidated (*Heterocycles* 1990, *31,* 629); a new coumarin - GU-12 - along with echinatin, naringenin, licoricone, glycyrin and isoliquiritigenin isolated from roots and its structure determined (*Planta Med.* 1990, *56,* 254); process developed for extraction of glycyrrhizin from roots (*Chem. Mikrobiol. Technol. Lebensm.* 1990, *12,* 179; *Chem. Abstr.* 1990, *113,* 197742 z); a new pentacyclic triterpenoid (I) isolated from roots and its structure established (*Z. Naturforsch.* 1990, *45*C, 937; *Chem. Abstr.* 1991, *114,* 78648 j); process for extraction of triterpene oligoglycosides (II and III) (Jpn. 2,72,187 (1990) Mar. 12; *Chem. Abstr.* 1990, *113,* 103375 g); isolation of 5,7-dihydroxy-5'-(γ,γ-dimethylallyl)flavanone, pinocembrin , prunetin and lupeol from vegetative parts (*Egypt. J. Pharm. Sci.* 1991, *32;* 275; *Chem. Abstr.* 1992, *117,* 239584 q); crystal structure of 18α-glycyrrhetinic acid determined (*J. Chem. Soc.* Perkin 2 1992, 65); five new flavonoids - glucoliquiritin apioside, prenyllicoflavone A, shinflavanone, shinpterocarpin and 1-methoxyphaseolin - isolated from air-dried roots and their structures elucidated (*Chem. Pharm. Bull.* 1994, *42,* 1056).

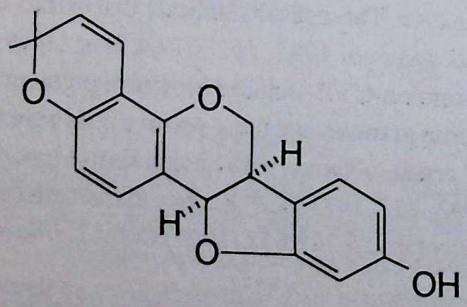
NEW COMPOUNDS



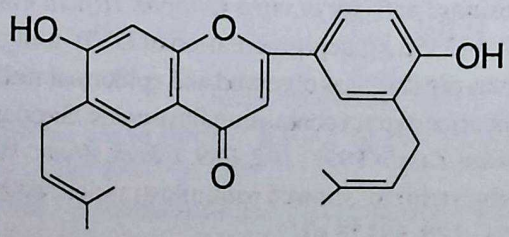
Glucoliquiritinapioside
R = Glu(2→1)Apiose



Shinflavanone



Shinpterocarpin



Prenyllicoflavone A

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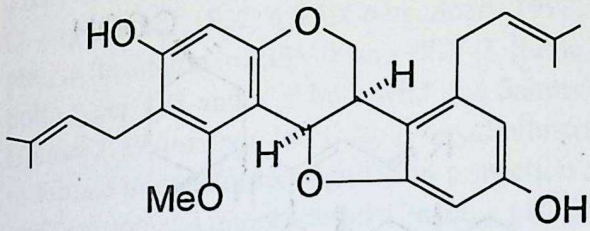
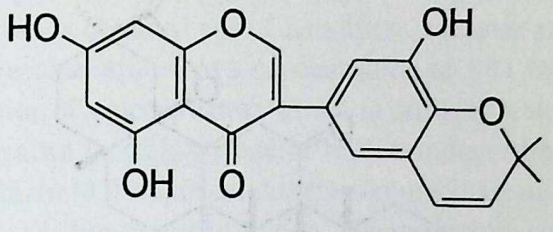
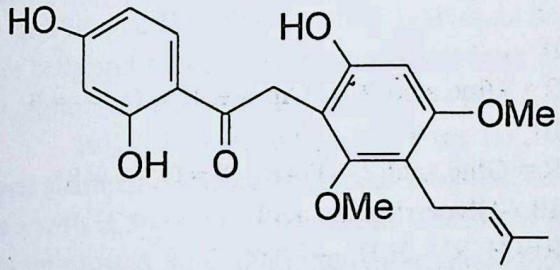


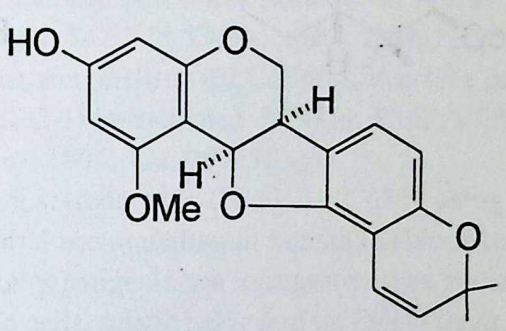
1-Methoxyficifolinol



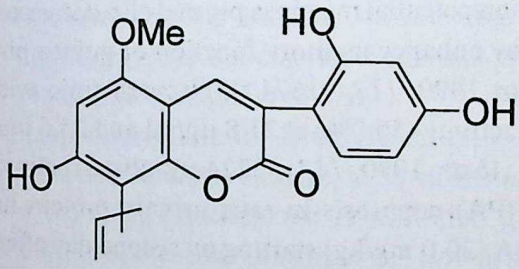
Semilicoisoflavone



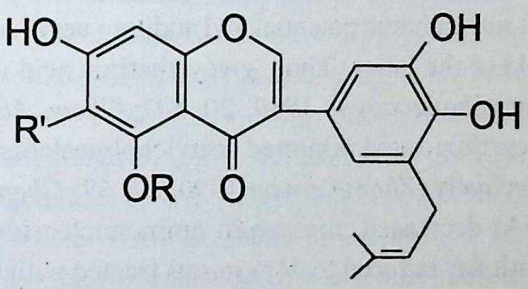
Licoriphenone



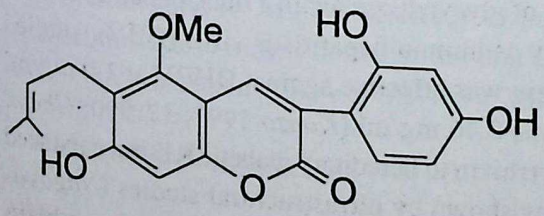
1-Methoxyphaseolin



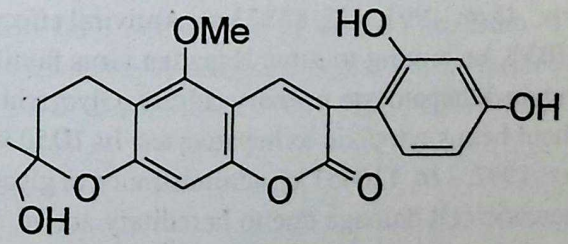
Licoarylcoumarin



Glisoflavone
R = Me, R' = H
Isoangustone A
R = H, R' = Isopentenyl



GU-12



Licopyranocoumarin

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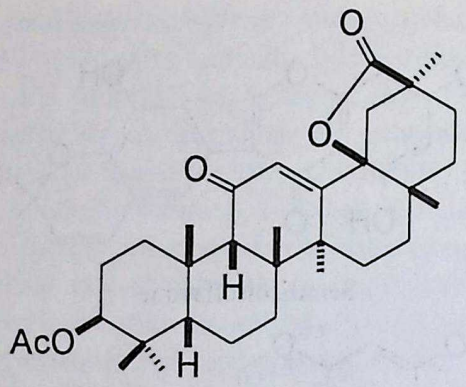

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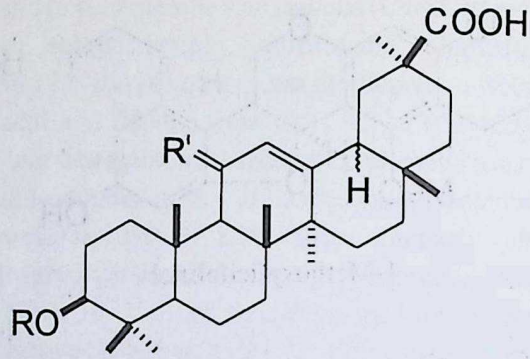

II
R = Gluc.acid(2→1)Apiose, R' = O, ~~ = β
III
R = Gluc.acid(2→1)Ara, R' = O, ~~ = β
18α-Glycyrrhetinic acid
R = H, R' = H,H, ~~ = α

BIOLOGICAL ACTIVITY

Glycyrrhetinic acid (100.0 mg/kg, i.m.) increased amplitude of short sound-induced cochlear microphonic potential and auditory nerve action potential in guinea pig and also decreased threshold of the latter. Thus, glycyrrhetinic acid may enhance auditory function of guinea pig inner ear (*Zhongcaoyao* 1989, *20,* 507; *Chem. Abstr.* 1990, *112,* 91674 t); glycyrrhetinic acid and glycyrrhizic acid inhibited acetylcholinesterase activity (50.0%) at 21.8 μg/ml and 25.6 μg/ml respectively (*Zhongcaoyao* 1990, *21,* 69; *Chem. Abstr.* 1990, *113,* 52224 x); glycyrrhetinic acid (GA) decreased puromycin aminonucleoside (PA) nephrosis in rats; urinary protein in fourteenth day reduced to 74% in rats treated with GA (20.0 mg/kg) starting on second day after injection of PA. Increase in serum cholesterol and decrease in serum protein were also suppressed (*Naunyn-Schmiedeberg's Arch. Pharmacol.* 1994, *349,* 318; *Chem. Abstr.* 1994, *121,* 26564 d).

Sodium glycyrrhizate possesed antiulcer activity and stimulated regeneration of skin (USSR 1,536,785 (1991) May 07; *Chem. Abstr.* 1992, *117,* 40461 s); skin reparative regeneration stimulant effect of β-glycyrrhizic acid and its salts on healing of skin abrasions and thermal injuries compared to that of dermazine and methyluracil in rats (*Khim.-Farm. Zh.* 1991, *25,* 39; *Chem. Abstr.* 1991, *115,* 85373 q). Antiviral effect of glycyrrhizin against duck hepatitis B virus (DHBV), belonging to same Hapadna virus family as human hepatitis B virus (HBV), studied using duck hepatocyte primary culture. Glycyrrhizin was effective against DHBV at 1.0 mg/ml without being cytotoxic to hepatocytes. Its ID50 was 0.46 mg/ml (*Kanzo* 1991, *32,* 990; *Chem. Abstr.* 1992, *116,* 120453 k); administration of glycyrrhizin to hereditary diabetic KK mice reduced pancreatic cell damage due to hereditary action, as shown by ultrastructural studies (*Nagoya-Shiritsu Daigaku Igakkai Zasshi* 1991, *42,* 819; *Chem. Abstr.* 1992, *116,* 166071 n); glycyrrhizin affects fibroblasts to suppress granuloma formation. Pulmonary granulomas induced in guinea pigs by Sephadex beads, were significantly suppressed by i.p. administration of glycyrrhizin.

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Thus, *in vivo* antigranulomatus effects of glycyrrhizin make it useful for treatment of such diseases (*J. Exp. Pathol.* 1992, *6,* 25; *Chem. Abstr.* 1992, *117,* 62544 y); glycyrrhizin (0.61 mM) inhibited plaque formation by HSV-1 and HSV-2. Same results obtained with Chandipura, measles and polio types 1, 2 and 3 of both wild and Sabins vaccine strains, at a concentration of 1.21 mM (*Indian J. Pharmacol.* 1994, *26,* 194); administration of aqueous extract (1.0% in drinking water) to female mice afforded significant protection against benzo[a]pyrene or NDEA-induced lung and forestomach tumorigenesis. Feeding glycyrrhizin (0.05%) in drinking water to female mice gave substantial protection against DMBA-induced skin tumor initiation. Glycyrrhetinic acid topically applied to female mice inhibited DMBA-induced skin tumor initiation as well as TPA-induced skin tumor promotion (*ACS Symp. Ser.* 1994, *547,* 329; *Chem. Abstr.* 1994, *120,* 95010 m); antitumor effect of glycyrrhizin on human hepatoma cell lines (PLC/PRF/5, Hep-G2), human liver cells and human pancreatic cancer line (BXPC-3) investigated. IC50 for PLC/PRF/5 was 1.0 mg/ml (*Cancer Lett.* 1994, *86,* 91; *Chem. Abstr.* 1994, *121,* 292196 y).

Isoliquiritigenin inhibited rat lens aldose-reductase (IC50 0.32 μM) using DL-glyceraldehyde as substrate. It also inhibited sorbitol accumulation in human red blood cells *in vitro* with IC50 of 2.0 μM. Administration of isoliquiritigenin via intragastric tube to diabetic rats suppressed sorbitol accumulation in red blood cells, sciatic nerve and rat lens (*Planta Med.* 1990, *56,* 254); isoliquiritigenin inhibited platelet aggregation, phosphoryation of proteins and formation of 12(S)-hydroxy-5,8,10-heptadecatrienoic acid, 12-hydroxyeicosatetraenoic acid and thromboxane B2. Results indicate that it elicits antiplatelet action by inhibiting not only cyclooxygenase but also lipoxygenase or peroxidase activity in platelets. It also showed anti-platelet action *in vivo* (*Eur. J. Pharmacol.* 1992, *212,* 87); licochalcones A and B, licopyranocoumarin, licoarylcoumarin, licocoumarone, glycyrrhisoflavone and glisoflavone inhibited xanthine oxidase, IC50 values ranged from 13.0 to 56.0 μM (*Chem. Pharm. Bull.* 1989, *37,* 3005); licochalcone A inhibited growth of both *Leishmania major* and *L. donovani* promastigotes and amastigotes. Growth of *L. major* promastigotes was totally inhibited in 20 hr incubation with licochalcone A at 50.0 μg/ml. At 0.5 μg/ml it markedly reduced infection rate of human peripheral blood monocyte-derived macrophages and U937 cells by *L. major* promastigotes and exhibited strong intracellular killing of parasite (*Antimicrob. Agents Chemother.* 1993, *37,* 2550; *Chem. Abstr.* 1994, *120,* 68923 e); licochalcone A inhibited *in vitro* growth of both chloroquine-susceptible (3D7) and chloroquine-resistant (Ddz) strains of *Plasmodium falciparum* to the same extent in [^{3}H]hypoxanthine uptake assay. Growth of parasites at all stages was inhibited by licochalcone A. Administered i.p. or orally for 3 to 6 days, it protected mice from *P. yoelii* infection. These results demonstrate that licochalcone A possesses potent antimalarial activity (*Antimicrob. Agents Chemother.* 1994, *38,* 1470; *Chem. Abstr.* 1994, *121,* 73154 e).

GMELINA (Verbenaceae)

G. arborea Roxb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 320).

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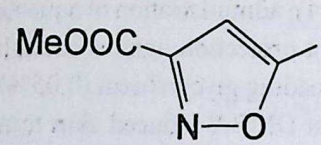
Major component linoleic acid (53.0%) identified along with lauric, myristic, palmitic, stearic, oleic, linolenic and arachidic acids in seed oil (*Pakistan J. Sci. Ind. Res.* 1991, *34*, 359; *Chem. Abstr.* 1992, *116*, 231882 u); leaves afforded premnazole (*Fitoterapia* 1992, *63*, 295).

NEW COMPOUNDS



Premnazole

BIOLOGICAL ACTIVITY

Premnazole showed anti-inflammatory activity comparable to that of phenylbutazone in reducing cotton pellet-induced granuloma formation in rats. It probably acts by regulating activity of AcTH (*Fitoterapia* 1992, *63*, 295).

G. hystrix Kurz; see *G. philippensis* Cham.

G. philippensis Cham. syn. *G. hystrix* Kurz (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 320).

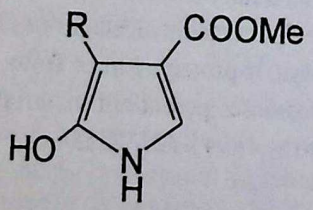
Determination of linoleic (30.7), palmitic (29.2), stearic (21.1), arachidic (6.3), behenic (4.7), oleic (2.9), myristic (2.3), lauric (1.5) and capric (1.3%) acids in seed oil (*Fette Wiss. Technol.* 1990, *92*, 131; *Chem. Abstr.* 1990, *112*, 232551 q).

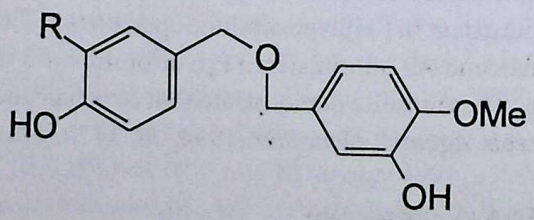
GNETUM (Gnetaceae)

G. montanum Markgraf syn. *G. scandens* Roxb. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 126).

Four new compounds (I, II, III and IV) isolated from stems and their structures determined; 2,3-diphenylpyrrole and N,N-dimethylethanolamine also isolated (*Zhiwu Xuebao* 1989, *31*, 878; *Chem. Abstr.* 1990, *113*, 94757 d).

NEW COMPOUNDS





I
R = OMe
II
R = CH_2OMe

III
R = H
IV
R = OH

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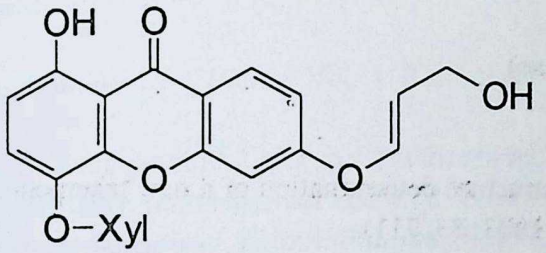
G. scandens Roxb.; see *G. montanum* Markgraf

GNIDIA (Thymelaeaceae)

G. glauca (Fresen.) Gilg. var. *glauca* syn. *Lasiosiphon eriocephalus* (Meissn.) Decne. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 321).

Isolation and structure determination of lasioside from bark and seeds; lasiocephalin also isolated (*Indian J. Chem.* 1994, *33*B, 89).

NEW COMPOUNDS



Lasioside

GOMPHRENA (Amaranthaceae)

G. globosa L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 321).

Isolation of three new betacyanins - gomphrenin I, gomphrenin II and gomphrenin III - from flowers and their structure elucidation (*Phytochemistry* 1992, *31,* 1801).

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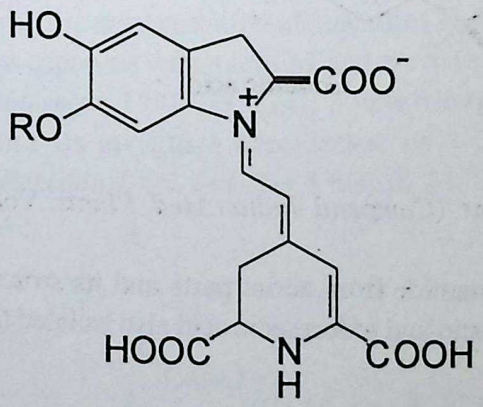

Gomphrenin I
R = Glu
Gomphrenin II
R = Glu(6-p-coumaroyl)
Gomphrenin III
R = Glu (6-caffeoyl)

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GOSSYPIUM (Malvaceae)

G. hirsutum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 352).

Synthesis of phytoalexin, lacinilene C 7-methyl ether (*Tetrahedron Lett.* 1993, *34,* 3707).

BIOLOGICAL ACTIVITY

Gossypol showed antitumor activity in SW-13 tumor-bearing nude mice (U.S. 5,51,353 (1991) Apr. 15; *Chem. Abstr.* 1991, *115,* 85409 f); gossypol inhibited activity of aldose reductase from human placenta (*J. Med. Chem.* 1991, *34,* 3301).

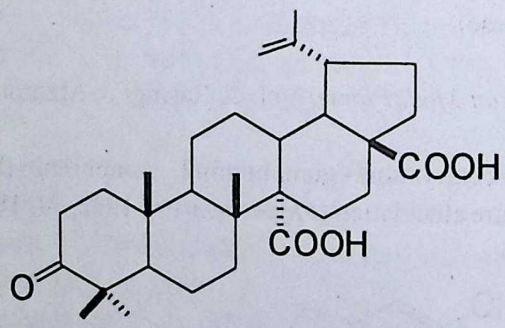
GOUANIA (Rhamnaceae)

G. microcarpa DC.

Isolation and structure determination of a new triterpenic acid - gouanic acid - from leaves (*Phytochemistry* 1993, *33,* 711).

Distribution: Peninsular India, ascending to 600 m in the hills.

NEW COMPOUNDS



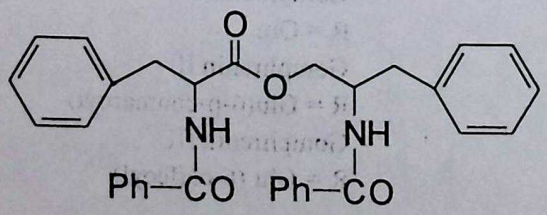
Gouanic acid

GRANGEA (Asteraceae)

G. maderaspatana (L.) Poir. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 353).

Isolation of auranamide from aerial parts and its structure elucidation; α-humulene, phytol, lupeol, centipedic acid and nidoresedic acid also isolated (*J. Indian Chem. Soc.* 1990, *67,* 596).

NEW COMPOUNDS



Auranamide

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GRAPTOPHYLLUM (Acanthaceae)

G. hortense Nees; see *G. pictum* (L.) Griff.

G. pictum (L.) Griff. syn. *G. hortense* Nees (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 127).

Ethanol extract showed anti-inflammatory activity against carrageenin-induced oedema in rats and also analgesic activity (*Chem. Pharm. Bull.* 1989, *37,* 2799).

GUAIACUM (Zygophyllaceae)

G. officinale L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 355).

Administration of plant extract (0.2 g/kg, p.o.) before induction of carrageenin oedema in rat paw, suppressed significantly both maximal and total oedema response. Extract was also active against chronic adjuvant arthritis (*J. Pharm. Pharmacol.* 1990, *46,* 286).

Isolation of two new saponins - guaiacin A and guaiacin B - from leaves and their structure elucidation (*Planta Med.* 1989, *55,* 307); another four new saponins - guaiacins C, D, E and F - isolated from leaves and stem bark and their structures determined (*Phytochemistry* 1990, *29,* 3287); isolation and structure elucidation of a new saponin - guaianin C - from stem bark (*Fitoterapia* 1989, *60,* 255); two new saponins - guaianins F and G - isolated from fruits and characterised as 3-O-[α-L-rhamnosyl(1→3)-α-L-rhamnosyl(1→2)-α-L-arabinosyl(3→1)-β-D-glucosyl]-30-norolean-12,20(29)-dien-28-oic acid-28-O-[β-D-glucosyl(1→6)-β-D-glucosyl]ester and 3-O-[α-L-rhamnosyl(1→3)-α-L-rhamnosyl(1→2)-α-L-arabinosyl(3→1)-β-D-glucosyl]-oleanolic acid-28-O-[β-D-glucosyl(1→6)-β-D-glucosyl] ester respectively (*Phytochemistry* 1989, *28,* 2169); isolation and structure determination of guaianins H, I, J, K and L from fruits (*J. Nat. Prod.* 1990, *53,* 1168); two saponins - guaianin M and akebia saponin PE - isolated and their structures established (*Fitoterapia* 1992, *63,* 226); a new triterpenoid saponin - guaianin N - isolated from flowers and its structure elucidation as 3-O-[β-D-glucosyl(1→3)-α-L-arabinosyl]oleanolic acid (*Pakistan J. Sci. Ind. Res.* 1993, *36,* 54; *Chem. Abstr.* 1994, *120,* 294091 p).

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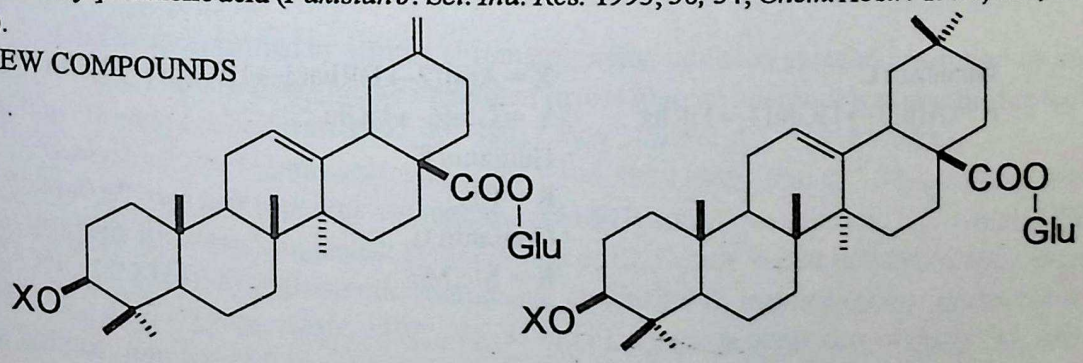

X = Ara(3→1)Glu

Guaiacin A Guaiacin B

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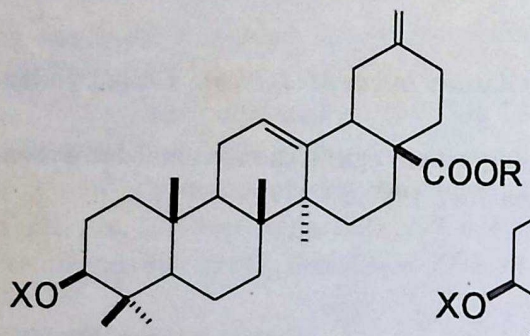
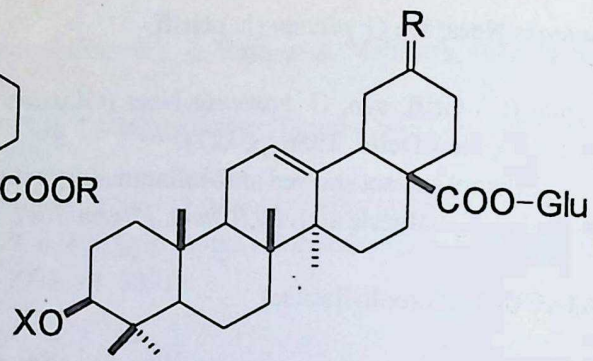
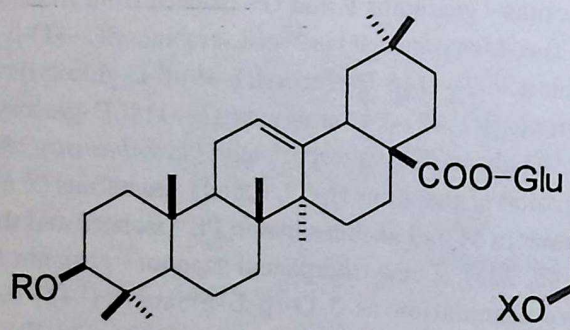
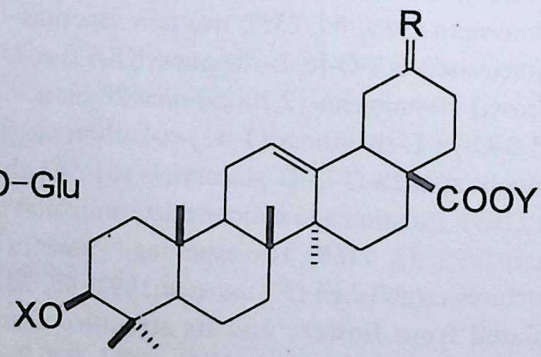




X = Ara[(2→1)Rha](3→1)Glu
Guaiacin C
R = H
Guaiacin D
R = Glu

X = Ara[(2→1)Glu](3→1)Glu
Guaiacin E
R = CH_2
Guaiacin F
R = Me,Me





Guaianin C
R = Ara(3→1)Glu(3→1)Rha

X = Ara[(2→1)Rha(3→1)Rha](3→1)Glu
Y = Glu(6→1)Glu
Guaianin F
R = CH_2
Guaianin G
R = Me,Me

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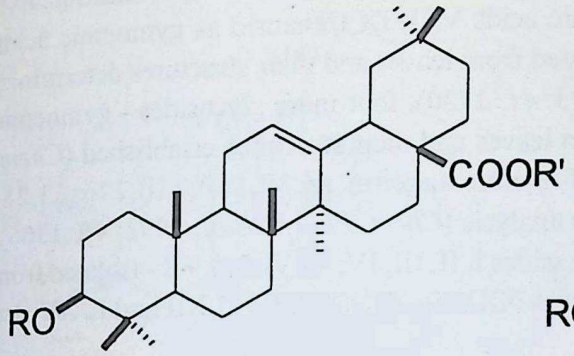

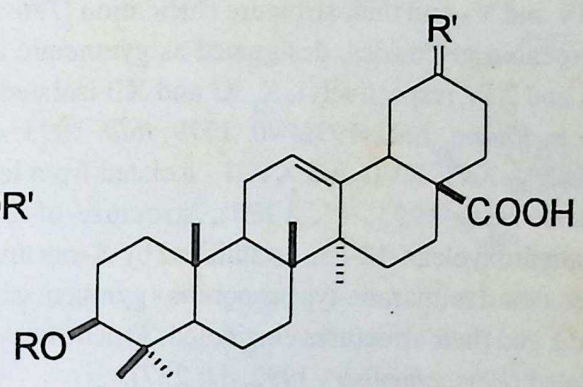

Guaianin H
R = Ara(3→1)Glu(3→1)Rha, R' = H
Guaianin I
R = Gluc.acid(3→1)Ara(2→1)Rha(2→1)Rha,
R' = Glu(6→1)Glu
Guaianin J
R = Gluc.acid(3→1)Ara,
R' = Glu(6→1)Glu(4→1)Rha(2→1)Rha
Guaianin K
R = Gluc.acid, R' = Glu(3→1)Ara[(3→1)Glu](2→1)Rha(2→1)Rha
Guaianin L
R = Gluc.acid[(3→1)Ara](4→1)Glu, R' = Glu(6→1)Glu(6→1)Rha

Guaianin M
R = Ara(2→1)Glu, R' = CH_2
Guaianin N
R = Ara(3→1)Glu, R' = Me,Me
Akebia saponin PE
R = Ara(2→1)Glu, R' = Me,Me

BIOLOGICAL ACTIVITY

Guaianin N showed antibacterial activity against *Pseudomonas pseudomaliae* (*Pakistan J. Sci. Ind. Res.* 1993, *36*, 54; *Chem. Abstr.* 1994, *120*, 294091 p).

GYMNEMA (Asclepiadaceae)

G. sylvestre (Retz.) Schult. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 357).

Leaf extract purified by affinity chromatography, inhibited glucose absorption in small intestine of rats. The observed glucose increment in oral glucose tolerance test may be due to this inhibition (*Yonago Igaku Zasshi* 1992, *43*, 397; *Chem. Abstr.* 1993, *118*, 94134 b).

Leaves afforded gymnemic acid (Jpn. 1,146,893 (1989) Jun. 08; *Chem. Abstr.* 1990, *112*, 104840 w); two new saponins - gymnemic acid VIII and gymnemic acid IX - isolated from leaves and their structures elucidated; gymnemic acids III, IV and V also isolated (*Chem. Pharm. Bull.* 1990, *38*, 2326); hypoglycaemic component, conduritol A, isolated (*Seito Gijutsu Kenkyu Kaishi* 1991, *39*, 71; *Chem. Abstr.* 1992, *116*, 37990 n); a peptide consisting of thirty five amino acids isolated from leaves (*Comp. Biochem. Physiol., Comp. Physiol.* 1991, *100*A, 309; *Chem. Abstr.* 1992, *116*, 51310 x); isolation of five new antisweet glycosides - gymnemasaponins I, II,

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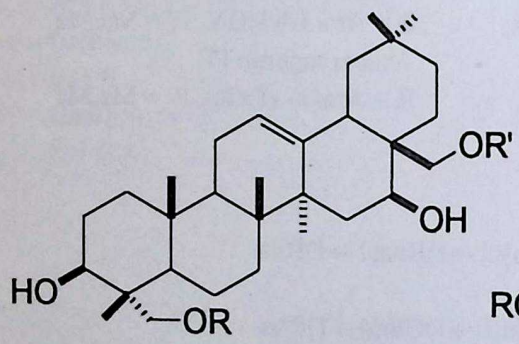
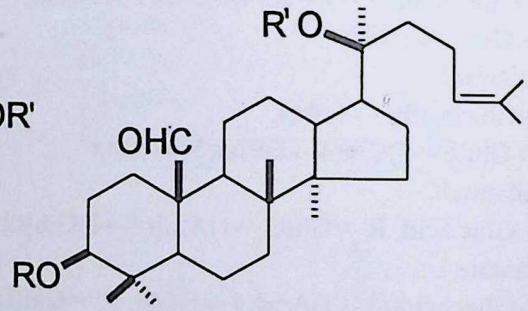
III, IV and V - and their structure elucidation (*Tetrahedron Lett.* 1991, *32,* 789); in addition, five triterpenoid glycosides, designated as gymnemic acids VIII, IX (renamed as gymnemic acids XIII and XIV respectively), X, XI and XII isolated from leaves and their structures determined (*Chem. Pharm. Bull.* 1992, *40,* 1779; *ibid.* 1993, *41,* 1730); four more glycosides - gymnemic acids XV, XVI, XVII and XVIII - isolated from leaves and their structures established (*Chem. Pharm. Bull.* 1993, *41,* 1730); structure of gymnemagenin as 3β,16β,21β,22α,23,28-hexahydroxyolean-12-ene established by X-ray analysis (*Chem. Pharm. Bull.* 1992, *40,* 1366); seven new dammarane-type saponins - gymnemasides I, II, III, IV, V, VI and VII - isolated from leaves and their structures elucidated; gypenosides XXVIII, XXXVII, LV, LXII and LXIII also isolated (*Phytochemistry* 1992, *31,* 237).

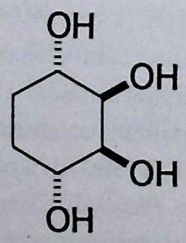
NEW COMPOUNDS





Gymnema saponin I
R = H, R' = Glu
Gymnema saponin II
R,R' = Glu
Gymnema saponin III
R = Glu, R' = Glu(6→1)Glu
Gymnema saponin IV
R = Glu(6→1)Glu, R' = Glu
Gymnema saponin V
R,R' = Glu(6→1)Glu

Gymnemaside I
R,R' = Glu
Gymnemaside II
R = Glu(2→1)Glu, R' = Glu
Gymnemaside III
R = Ara(2→1)Glu, R' = Glu
Gymnemaside IV
R = Glu, R' = Glu(6→1)Xyl
Gymnemaside V
R = Glu(2→1)Glu, R' = Glu(6→1)Xyl



Conduritol A

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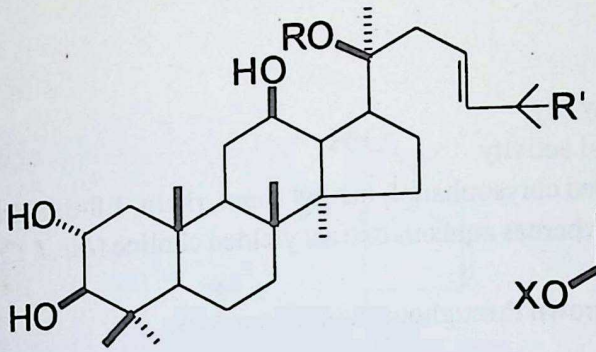
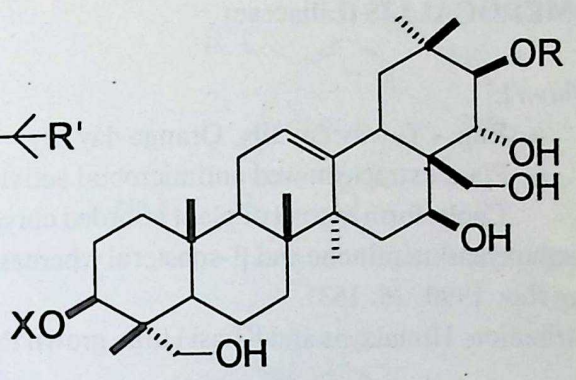
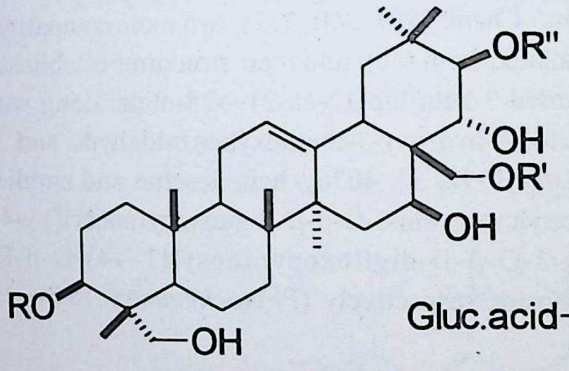
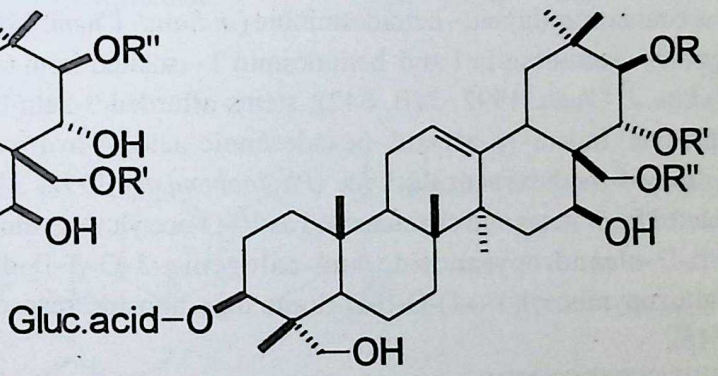




Gymnemaside VI
R = Glu(6→1)Rha, R' = OH
Gymnemaside VII
R = Glu(6→1)Xyl, R' = OOH

X = Gluc.acid(3→1)Arabino-2-Hexulopyranose
Gymnemic acid VIII
R = 2-Me Butyryl
Gymnemic acid IX
R = Tigloyl





Gymnemic acid X
R = Gluc.acid, R' = Ac, R" = H
Gymnemic acid XI
R = Gluc.acid, R',R" = Tigloyl
Gymnemic acid XII
R = Gluc.acid(3→1)Glu, R' = Ac, R" = Tigloyl
Gymnemic acid XIII
R = Gluc.acid, R' = 2-Me Butyryl, R" = H
Gymnemic acid XIV
R = Gluc.acid, R' = Tigloyl, R" = H

Gymnemic acid XV
R = 2-Me Butyryl, R' = 2-Me Crotonyl, R" = H
Gymnemic acid XVI
R,R" = H, R' = 2-Me Crotonyl
Gymnemic acid XVII
R = Benzoyl, R',R" = H
Gymnemic acid XVIII
R,R' = H, R" = Benzoyl

BIOLOGICAL ACTIVITY

Gymnemic acid had suppressed effect in blood glucose level after oral sucrose administration in normal rats (*Hanyang Vidae Haksulchi* 1989, *9*, 505; *Chem. Abstr.* 1990, *112*,

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HEMEROCALLIS (Liliaceae)

H. fulva L.

Eng. - Tawny day lily, Orange day lily,

Plant extract showed antimicrobial activity.

Cholroform extract of plant afforded chrysophanol, methyl rhein, rhein, 1,8-dihydroxy-3-methoxyanthraquinone and β-sitosterol whereas aqueous extract yielded choline (*Int. J. Crude Drug Res.* 1990, *28,* 153).

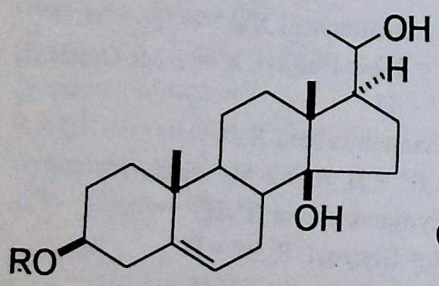
Distribution: Himalayas and Khasi Hills, grown throughout India in gardens.

HEMIDESMUS (Asclepiadaceae)

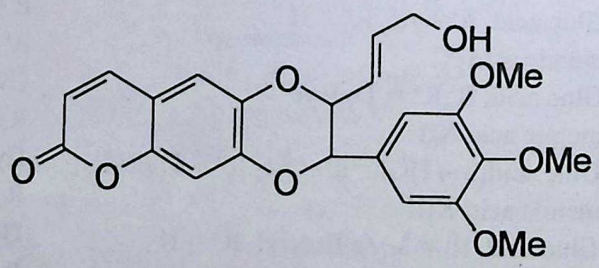
H. indicus (L.) R.Br. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 374).

Two new calogenin glycosides - indicine and hemidine - isolated from stems and their structures established (*Phytochemistry* 1991, *30,* 297); isolation and structure elucidation of a new coumarino-lignoid - hemidesminine (*Indian J. Chem.* 1991, *30*B, 712); two more coumarino-lignoids - hemidesmin 1 and hemidesmin 2 - isolated from roots and their structures established (*Indian J. Chem.* 1992, *31*B, 342); stems afforded 3-keto-lup-12-en-21→28-olide along with lupanone, lupeol-3β-acetate, hexadecanoic acid, 4-hydroxy-3-methoxybenzaldehyde and 3-hydroxy-4-methoxybenzaldehyde (*Phytochemistry* 1992, *31,* 4036); hemidescine and emidine isolated from stems and characterised as 20-O-acetylcalogenin-3-O-β-D-digitoxopyranosyl(1→4)-O-β-D-oleandropyranoside and calogenin-3-O-β-D-digitoxopyranosyl(1→4)-O-β-D-digitoxopyranosyl(1→4)-O-β-D-digitoxopyranoside respectively (*Phytochemistry* 1994, *35,* 1545).

NEW COMPOUNDS



Indicine
R = Digitoxose
Hemidine
R = Boivinose



Hemidesminine

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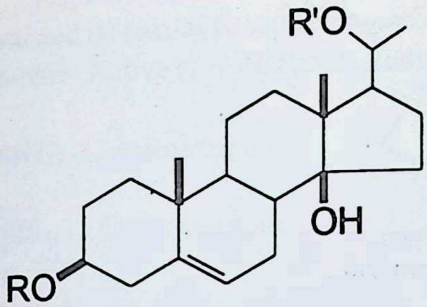
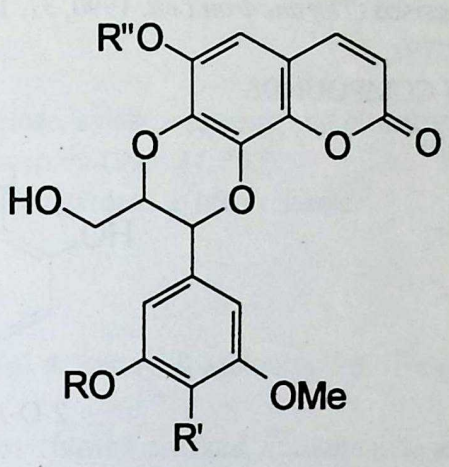
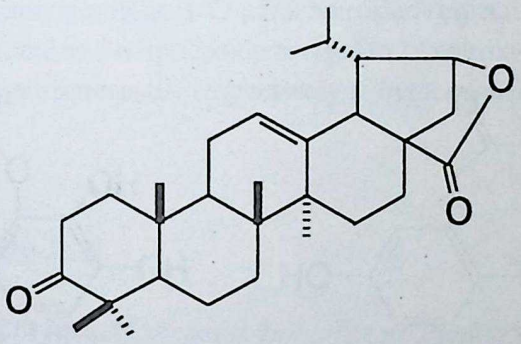




Hemidescine
R = Oleandrose(4→1)Digitoxose, R' = Ac
Emidine
R = Digitoxose(4→1)Digitoxose(4→1)Digitoxose, R' = H

Hemidesmin 1
R = Me, R' = OMe, R" = H
Hemidesmin 2
R,R' = H, R" = Me



3-Keto-lup-12-en-21→28-olide

HEMIGRAPHIS (Acanthaceae)

H. hirta T.Anders.

Isolation of hentriacontanol and stigmasterol (*J. Indian Chem. Soc.* 1991, *68*, 634).
Distribution: West Bengal and Uttar Pradesh, in plains.

HEPTAPLEURUM (Araliaceae)

H. impressum Clarke; see *Schefflera impressa* (Clarke) Harms

H. venulosum Seem.; see *Schefflera venulosa* (Wt. & Arn.) Harms var. *venulosa*

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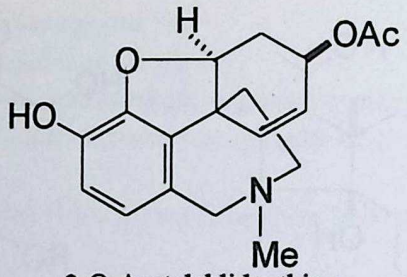
synthesised (*Tetrahedron Lett.* 1990, *31*, 1523); synthesis of montanine (*Tetrahedron Lett.* 1991, *32*, 7079).

NEW COMPOUNDS



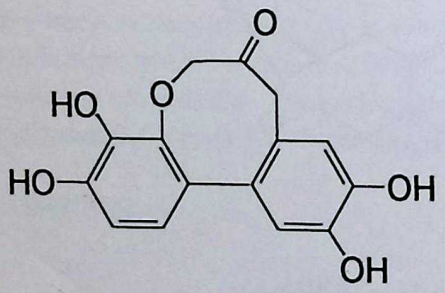
2-O-Acetylchlidanthine

HAEMATOXYLUM (HAEMATOXYLON) (Mimosaceae)

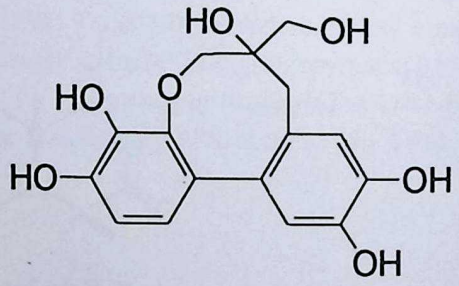
H. campechianum L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 130).

Two new dibenz[b,d]oxocin derivatives - hematoxylol A and hematoxylol B isolated from heartwood and their structures established; hematoxylin also isolated (*Chem. Pharm. Bull.* 1991, *39*, 1382).

NEW COMPOUNDS



Hematoxylol A



Hematoxylol B

HAGENIA (Rosaceae)

H. abyssinica Gmel. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 364).

α-Kosin, kosotoxin and protokosin isolated from female flowers (*J. Pharm. Biomed. Anal.* 1992, *10*, 555; *Chem. Abstr.* 1993, *118*, 15967 z).

BIOLOGICAL ACTIVITY

α-Kosin, kosotoxin and protokosin significantly inhibited colony formation *in vitro* by MAC 15A tumor cells. Kosotoxin and protokosin also showed cytotoxicity against MAC tumor cells in mice. Kosotoxin was toxic at >50.0 mg/kg, p.o., and its LD was 100.0 mg/kg, i.p. (*J. Pharm. Biomed. Anal.* 1992, *10*, 555; *Chem. Abstr.* 1993, *118*, 15967 z).

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HAKEA (Proteaceae)

H. sericea Schrad.

A gum exudate containing arabinose, galactose, xylose, mannose and glucuronic acid obtained and its partial structure proposed (*Phytochemistry* 1993, *34,* 709).

Distribution: Native of Australia, introduced into Indian gardens in hilly regions.

HALENIA (Gentianaceae)

H. elliptica D.Don (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 365).

Fraction containing xanthone glucosides showed marked antiamoebic activity (*Phytochemistry* 1989, *28,* 2819).

2,3,7-Trimethoxyxanthone-1-O-glucoside and 2,3,5-trimethoxyxanthone-1-O-glucoside isolated as their acetates; 1-hydroxy-2,3,4,7-tetramethoxyxanthone, 1-hydroxy-2,3,4,5-tetramethoxyxanthone, 1-hydroxy-2,3,7-trimethoxyxanthone, 1-hydroxy-2,3,5-trimethoxyxanthone, oleanolic acid and sitosterol glucoside also isolated (*Phytochemistry* 1989, *28,* 2819); two new xanthones - ellipticol and ellipticoside - isolated and proposed as 1-hydroxy-3,6,8-trimethoxyxanthone and 3,6,8-trimethoxyxanthone-1-O-primeveroside respectively (*Phytochemistry* 1990, *29,* 961); structures of ellipticol and ellipticoside revised to 1-hydroxy-2,3,7-trimethoxyxanthone and 2,3,7-trimethoxy-1-O-primeveroside respectively (*Phytochemistry* 1991, *30,* 1347).

HAMELIA (Rubiaceae)

H. erecta Jacq.; see *H. patens* Jacq.

H. patens Jacq. syn. *H. erecta* Jacq. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 330).

Isopteropodine and pteropodine isolated from aerial parts (*Rev. Latinoam. Quim.* 1989, *20,* 71; *Chem. Abstr.* 1990, *112,* 4566 t); total synthesis of isopteropodine and pteropodine (*Tetrahedron Lett.* 1990, *31,* 4557); isolation and characterisation of 5,7,2',5'-tetrahydroxyflavanone-7-rutinoside from aerial parts along with narirutin and rosmarinic acid (*Phytochemistry* 1990, *29,* 2358).

HAPLOPHRAGMA (Bignoniaceae)

H. adenophyllum (DC.) Dop; see *Fernandoa adenophylla* (Wall. ex G.Don) V. Steenis

HARRISONIA (Simaroubaceae)

H. bennettii Hook.f. ex Bennett; see *H. perforata* (Blanco) Merr.

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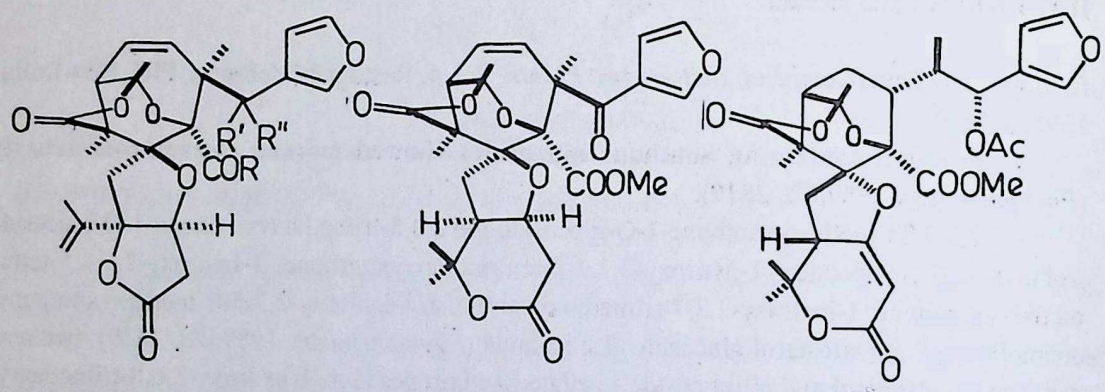
H. brownii A.Juss.

Two new rearranged limonoids - brownins A and B - isolated from bark and their structures elucidated (*Tetrahedron* 1993, *49*, 2209); brownin C isolated from bark and brownin G from wood - and their crystal structures determined (*Phytochemistry* 1994, *35*, 451).

Distribution: Andaman Islands.

NEW COMPOUNDS



Brownin A
R R' = -O-, R" = H
Brownin B
R = OMe, R'R" = O

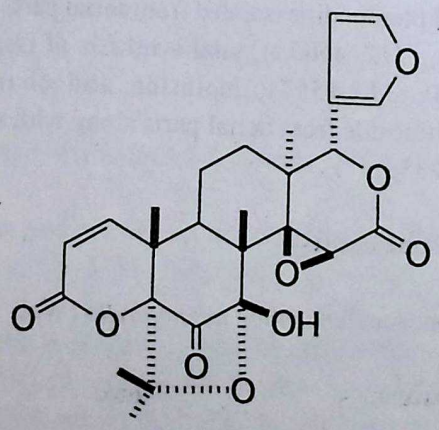
Brownin C

Brownin G

H. perforata (Blanco) Merr. syn. *H. bennettii* Hook.f. ex Bennett (nom. illeg.), *Limonia pubescens* Wall. ex Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 366).

A new tetranortriterpenoid - perforatin - isolated from dried leaves and its crystal structure determined (*Aust. J. Chem.* 1991, *44*, 165).

NEW COMPOUNDS



Perforatin

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HEDERA (Araliaceae)

H. helix L.; see *H. nepalensis* K.Koch

H. nepalensis K.Koch syn. *H. helix* auct. (non L.), *H. rhombea* Sieb. & Zucc. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 366).

Isolation of α-hederin (*Phytochemistry* 1990 *29,* 451); leaves afforded rutin, caffeic acid, 3,5-dicaffeoylquinic acid and kizuta saponin K5 (*Arch. Pharmacal Res.* 1993, *16,* 331; *Chem. Abstr.* 1994, *120,* 226663 b).

BIOLOGICAL ACTIVITY

Structure-activity relationship studies on α-hederin and its analogs showed that terminal rhamnose is more important for antifungal activity than for haemolytic activity, whereas free carboxylic acid is more important for haemolytic activity (*Phytochemistry* 1990, *29,* 451).

H. rhombea Sieb. & Zucc.; see *H. nepalensis* K.Koch

HEDYCHIUM (Zingiberaceae)

H. aurantiacum Rosc.

(+)Linalool (80.6) and monoterpene hydrocarbons (16.0%) determined in rhizome essential oil by GC (*J. Essent. Oil Res.* 1992, *4*, 129; *Chem. Abstr.* 1993, *188* 143507 m).
Distribution: Himalayas, from Kumaon to Bhutan, alt. 600-2000 m.

H. coronarium Koen. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 368).

Isolation of a new labdane diterpene - isocoronarin D - from rhizomes of Nepalese plant and its structure elucidation by X-ray analysis; coronarin D, its ethyl ether and coronarin E also isolated (*Aust. J. Chem.* 1991, *44*, 1789); rhizomes also afforded coronarin D methyl ether and 14,15,16-trinorlabda-8(17),11-(E)dien-13-al (I), whose structure elucidated (*Nat. Prod. Lett.* 1993, *3*, 163; *Chem. Abstr.* 1994, *121*, 153352 h); identification of linalool, methyl benzoate, cis-jasmone, eugenol, (E)isoeugenol, jasmin lactone, methyl jasmonate and methyl epijasmonate in flower oil by GC-MS (*J. Essent. Oil Res.* 1993, *5*, 123; *Chem. Abstr.* 1993, *119*, 177576 u).

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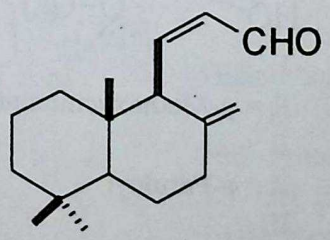

I

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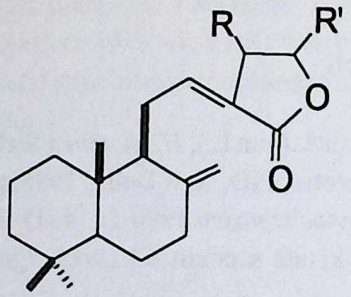


Isocoronarin D
R = β-OH, R' = H
Coronarin D methyl ether
R = H, R' = β-OMe

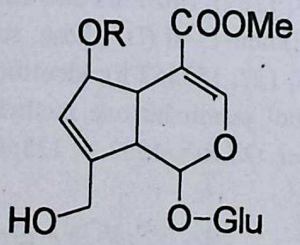
HEDYOTIS (Rubiaceae)

H. corymbosa (L.) Lam.; see *Oldenlandia corymbosa* L.

H. diffusa Willd. syn. *Oldenlandia diffusa* (Willd.) Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 369).

A polysaccharide composed of glucose, galactose and glucuronic acid isolated (*Lanzhou Daxue Xuebao, Ziran Kexueban* 1990, *26,* 113; *Chem. Abstr.* 1993, *118,* 35951 t); isolation and structure elucidation of three new (Z)iridoid glucosides (I, II and III) from aerial parts; in addition, their respective (E) isomers also isolated (*J. Nat. Prod.* 1991, *54,* 254); a polysaccharide - HD-W-3-B - composed of rhamnose, arabinose, xylose, mannose, galactose and glucose isolated and its structure proposed (*Youji Huaxue* 1992, *12,* 428; *Chem. Abstr.* 1992, *117,* 230117 g).

NEW COMPOUNDS



I
R = p-Methoxycinnamoyl
II
R = p-Feruloyl
III
R = p-Coumaroyl

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BIOLOGICAL ACTIVITY

Polysaccharide showed antitumor activity against sarcoma-180 cells implanted in mice (*Lanzhou Daxue Xuebao, Ziran Kexueban* 1990, *26,* 113; *Chem. Abstr.* 1993, *118,* 35951 t).

H. hispida Retz.; see *H. verticillata* (L.) Lamk.

H. verticillata (L.) Lamk. syn. *H. hispida* Retz.

Kaempferitrin isolated from leaves (*Planta Med.* 1994, *60,* 388).

Distribution: Himalayas, from Himachal Pradesh to Sikkim, Assam and Meghalaya, ascending to 1200 m.

BIOLOGICAL ACTIVITY

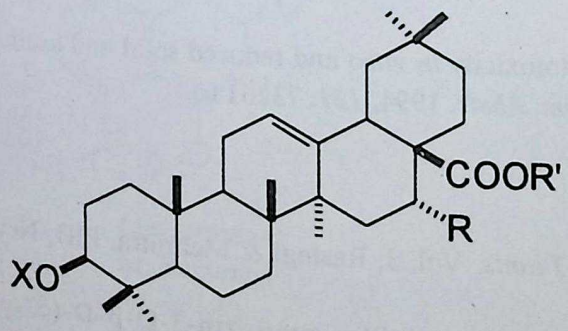
Kaempferitrin exhibited cytotoxicity in brine shrimp bioassay system, IC50 21.9 μg/ml (*Planta Med.* 1994, *60,* 388).

HELIANTHUS (Asteraceae)

H. annuus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 369).

Cholesterol and 23-dehydrocholesterol isolated from pollen (*Agric. Biol. Chem.* 1989, *53,* 3363); gibberellins A75, A76 and 3-epi-A72 detected in mature seeds by GLC-MS (*J. Chem. Soc.* Perkin 1, 1990, 145); three new bisdesmosidic triterpenoid saponins - helianthosides 1, 2 and 3 - isolated from flowers and their structures established (*Planta Med.* 1991, *57,* 471); three sesquiterpenes - glandulone A, glandulone B and glandulone C - isolated from leaves of cv. *giganteus* and their structures established (*Phytochemistry* 1992, *31,* 1541); a glucuronoxylan type hemicellulose isolated from hulls (*Carbohydr. Res.* 1993, *243,* 323; *Chem. Abstr.* 1994, *120,* 50172 z); α-pinene (86.2), β-pinene (4.1) and butyl acetate (2.3%) determined in stem by head-space analysis (*Fresenius J. Anal. Chem.* 1993, *347,* 465; *Chem. Abstr.* 1994, *120,* 62085 m).

NEW COMPOUNDS



X = Glu[(2→1)Rha](4→1)Xyl

Helianthoside 1
R = H, R' = Ara(2→1)Rha(4→1)Glu
Helianthoside 2
R = OH, R' = Ara(2→1)Rha(4→1)Glu
Helianthoside 3
R = OH, R' = Glu(2→1)Rha(4→1)Glu

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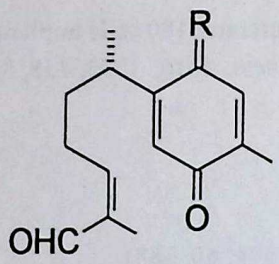

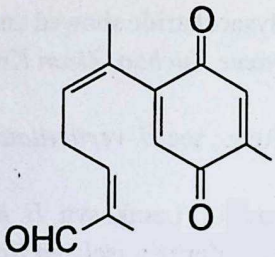

Glandulone A
R = O
Glandulone C
R = OH,H

Glandulone B

BIOLOGICAL ACTIVITY

Glandulones A, B and C exhibited antimicrobial activity (*Phytochemistry* 1992, *31*, 1541).

H. tuberosus L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 336).

Tuberonic acid derivative, jasmonic acid and polyacetylenic glycosides isolated (*Curr. Plant Sci. Biotechnol. Agric.* 1992, *13,* 286; *Chem. Abstr.* 1993, *118,* 187785 e); four new polyacetylenic glucosides isolated from leaves and characterised as β-D-glucopyranosyl-helianthenates C, D, E and F (*Biosci., Biotechnol., Biochem.* 1993, *57,* 1492; *Chem. Abstr.* 1994, *120,* 294082 m).

HELICANTHES (Loranthaceae)

H. elastica (Desr.) Danser (*elasticus*)

A partially purified protein on Sephadex obtained from plant grown on *Mangifera indica* and *Citrus maxima* (*Cancer Lett.* 1994, *81,* 53; *Chem. Abstr.* 1994, *121,* 73261 n).
Distribution: Western peninsular India.

BIOLOGICAL ACTIVITY

Partially purified protein exhibited cytotoxicity *in vitro* and reduced solid and ascites tumors in mice (*Cancer Lett.* 1994, *81,* 53; *Chem. Abstr.* 1994, *121,* 73261 n).

HELICHRYSUM (Asteraceae)

H. bracteatum Andr. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 337).

Luteolin, its 7-O-glucoside and 7-O-glucuronide, quercetin-3-O-β-D-(6"-p-coumaroyl)glucoside, kaempferol-3-O-β-D-(6"-p-coumaroyl)glucoside, gossypetin-8-O-β-D-glucoside, gossypetin-8-O-β-D-glucuronide, apigenin, chrysoeriol, hispidulin, scutellarein and

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caffeic, syringic, isochlorogenic and ellagic acids isolated (*Pharmazie* 1993, *48*, 230; *Chem. Abstr.* 1993, *119*, 68080 g).

H. buddleioides DC.

Isolation of luteolin, cernuoside and bractein from flowers (*J. Indian Chem. Soc.* 1989, *66*, 493).

Distribution: Western Ghats.

HELICIA (Proteaceae)

H. erratica Hook.f.; see *H. nilagirica* Bedd.

H. nilagirica Bedd. syn. *H. erratica* Hook.f. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 370).

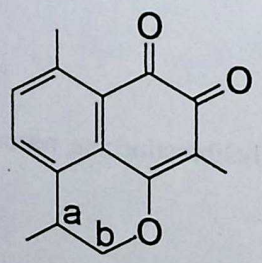
A process developed for extraction of helicid (*Zhongguo Yiyao Gongye Zazhi* 1991, *22*, 485; *Chem. Abstr.* 1992, *116*, 158681 w).

HELICTERES (Sterculiaceae)

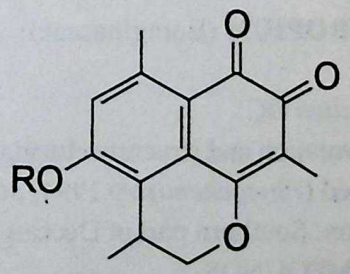
H. angustifolia L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 371).

A new sesquiterpenoid quinone - mansonone M- isolated from root bark along with mansonones E, F and H and its structure established; structure of helicquinone found to be same as that of mansonone H methyl ether (*Phytochemistry* 1990, *29*, 980); isolation of two new flavonoids (I and II) from roots bark and determination of their structures as takakin-8-O-β-D-glucuronide-6"-methyl ester and takakin-8-O-β-D-glucuronide-2"-sodium sulphate respectively; takakin-8-O-β-D-glucuronide also isolated (*Heterocycles* 1994, *38*, 1399).

NEW COMPOUNDS



Mansonone E
Mansonone F
ab =Δ



Mansonone H
R = H
Mansonone M
R = Me

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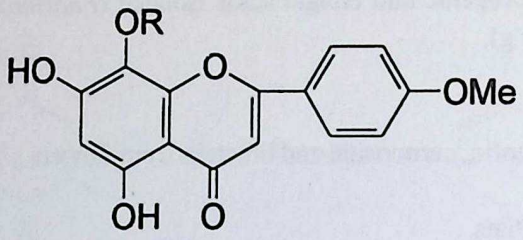

I

R = Gluc.acid (6-Me)

II

R = Gluc.acid(2-SO_3Na)

H. isora L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 372).

A new compound methyl 3β,27-diacetoxylup-20(29)-en-28-oate, isolated along with isorin which was characterised as methyl 3-oxo-27-acetoxyolean-12-en-28-oate; betulinic acid, oleanolic acid, daucosterol and β-sitosterol also isolated (*Zhongguo Yaoke Daxue Xuebao* 1991, *22,* 203; *Chem. Abstr.* 1992, *116,* 124855 r).

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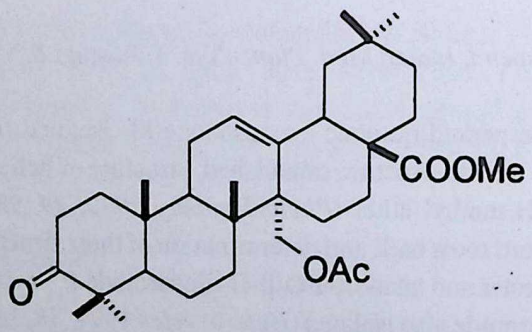


Isorin

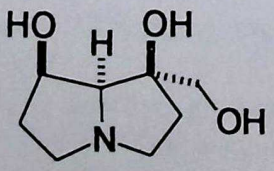
HELIOTROPIUM (Boraginaceae)

H. bracteatum DC.

Isolation and structure elucidation of pyrrolizidine alkaloid, helibractinecine; retronecine also isolated (*Phytochemistry* 1994, *36,* 245).

Distribution: Southern part of Deccan Peninsula.

NEW COMPOUNDS



Helibractinecine

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H. curassavicum L. var. *curassavicum* (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 372).

Stucture of curassanecine determined and confirmed by synthesis (*J. Nat. Prod.* 1991, *54,* 1062); isolation of heliocurrassavicine N-oxide from aerial parts and its structure elucidation (*Rev. Cubana Farm.* 1992, *26,* 52; *Chem. Abstr.* 1994, *121,* 104063 f).

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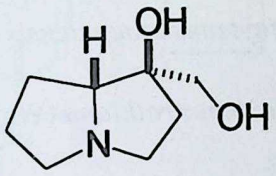


Curassanecine

H. eichwaldi Steud ex. DC. var. *lasiocarpum* (Fisch. & Mey.) C.B. Clarke; see *H. europaeum* L. var. *lasiocarpum* (Fisch. & Mey.) Kazmi

H. europaeum L. var. *lasiocarpum* (Fisch. & Mey.) Kazmi syn. *H. eichwaldi* Steud. var. *lasiocarpum* (Fisch. & Mey.) C.B. Clarke, *H. lasiocarpum* Fisch. & Mey. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 209).

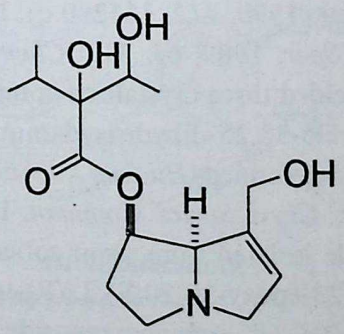
Alkaloid content of dried seeds was 1.94%; heliotrine and lasiocarpin isolated from seeds (*Khim. Prir. Soedin.* 1990, 701; *Chem. Abstr.* 1991, *114,* 203587 s).

H. keralense Sivarajan & Manilal

Isolation of a pyrrolizidine alkaloid - isolycopsamine - along with intermedine and retronecine and its structure determination (*Phytochemistry* 1990, *29,* 361).

Distribution: Assam, Andaman Islands, Kerala and Tamil Nadu.

NEW COMPOUNDS



Isolycopsamine

H. lasiocarpum Fisch. & Mey.; see *H. europaeum* L. var. *lasiocarpum* (Fisch. & Mey.) Kazmi

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210821 a); gymnema saponins III, IV and V showed antisweet activity (*Tetrahedron Lett.* 1991, *32,* 789); treatment of surface of rat tongue with peptide at >1.0 μM concentration suppressed selectively neutral responses of sweet taste stimuli (*Comp. Biochem. Physiol., Comp. Physiol.* 1991, *100*A, 309; *Chem. Abstr.* 1992, *116,* 51310 x).

GYMNOSPORIA (Celastraceae)

G. emarginata (Willd.) Thw.; see *Maytenus senegalensis* (Lamk.) Excell

G. rothiana (Walp.) Lawson; see *Maytenus rothiana* (Walp.) A. Callen

G. senegalensis (Lamk.) Loes.; see *Maytenus senegalensis* (Lamk.) Excell

G. spinosa (Forsk.) Fiori; see *Maytenus senegalensis* (Lamk.) Excell

GYNANDROPSIS (Capparaceae)

G. gynandra (L.) Briq.; see *Cleome gynandra* L.

G. pentaphylla (L.) DC.; see *Cleome gynandra* L.

GYNOSTEMMA (Cucurbitaceae)

G. pedata Blume; see *G. pentaphyllum* (Thunb.) Makino

G. pentaphyllum (Thunb.) Makino syn. *G. pedata* Blume (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 358).

Isolation of malonic acid, ombuoside and rutin from aerial parts (*Zhongguo Zhongyao Zazhi* 1989, *14,* 676; *Chem. Abstr.* 1990, *112,* 155260 q); leaves afforded isofucosterol and β-sitosterol (*Boll. Soc. Ital. Biol. Sper.* 1989, *65,* 317; *Chem. Abstr.* 1990, *112,* 95530 r); acid hydrolysis of aqueous extract yielded three crystalline compounds, of which two characterised as gynogenin II (20(R)21,24-cyclo-3β,25-dihydroxydammar-23(24)-en-21-one) and ombuin; crystal structure of gynogenin II determined (*Huaxue Xuebao* 1991, *49,* 932; *Chem. Abstr.* 1992, *116,* 148199 f; *Acta Crystallogr., Cryst. Struct. Commun.* 1991, *47*C, 790; *Chem. Abstr.* 1991, *115,* 29681 b); a new gypenoside isolated from plant collected from Hubei province of China and characterised as 19-oxo-21,23-epoxy-3β,20(S),21(R)-trihydroxydammar-24-ene-3-O-{[α-rhamnosyl (1→2)][β-xylosyl(1→3)]-α-L-arabinopyranoside} (*Linchan Huaxue Yu Gongye* 1993, *13,* 265; *Chem. Abstr.* 1994, *121,* 175131 n).

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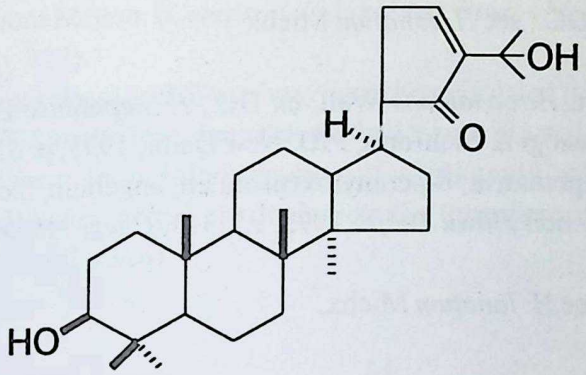


Gynogenin II

BIOLOGICAL ACTIVITY

Protective effect of gypenosides on ischemic myocardium in rats studied. Treatment with gypenosides significantly decreased infarct size at 24 hr after coronary occlusion. Similar protective effect of gypenosides observed *in vitro* on cultured damaged cardiac cells (*Zhongguo Yaoxue Zazhi* 1990, *25*, 398; *Chem. Abstr.* 1990, *113*, 204659 h).

HAEMANTHUS (Amaryllidaceae)

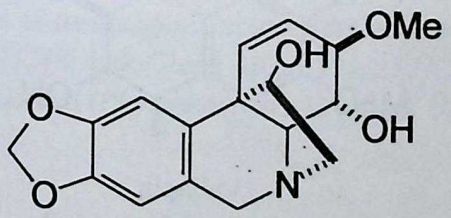
H. albiflos Jacq.

Eng. - Blood lily.

Isolation of a new crinane alkaloid - albiflomanthine - and its structure determination (*Heterocycles* 1994, *38*, 965).

Distribution: Native of Africa, grown in Indian gardens.

NEW COMPOUNDS



Albiflomanthine

H. kalbreyeri Baker; see *H. multiflorus* Martyn

H. multiflorus Martyn syn. *H. kalbreyeri* Baker (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 364).

Isolation of 2-O-acetylchlidanthine from bulbs and its structure determination; galanthamine, lycorine and haemultine also isolated (*Phytochemistry* 1989, *28*, 3248); hippadine

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HERACLEUM (Apiaceae)

H. candicans Wall. ex DC.; see *H. lanatum* Michx.

H. lanatum Michx. syn. *H. candicans* Wall. ex DC., *H. nepalense* D.Don (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 339).

Bergapten, imperatorin, 8-geranyloxypsoralen, angelicin, stearic acid and β-sitosterol isolated from roots (*Yunnan Zhiwu Yanjiu* 1993, *15,* 313; *Chem. Abstr.* 1994, *120,* 50144 s).

H. nepalense D.Don; see *H. lanatum* Michx.

H. rigens Wall. ex DC. var. *rigens*

Fruits contained 5-(3-methylbut-2-enyl)oxy-7-methoxycoumarin, isopimpinellin, 8-hydroxy-5-methoxyfuranocoumarin, β-sitosterol, (2S,3S)camphane-2,3-diol, β-sitosterol glucoside, bergapten and heraclenol (*Indian Drugs* 1990, *27,* 320).

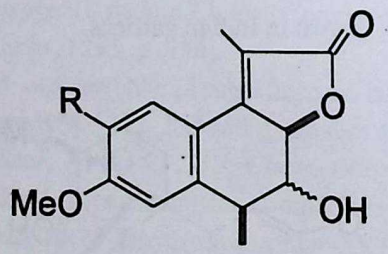
Distribution: Hills of southern peninsular India.

HERITIERA (Sterculiaceae)

H. littoralis Ait. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 376).

Isolation of two new cadinane sesquiterpenes - vallapin and vallapianin - and their structure determination by X-ray analysis (*J. Nat. Prod.* 1991, *54,* 286).

NEW COMPOUNDS



Vallapin
R = Me, ~ = β
Vallapianin
R = CH_2OH, ~ = α

BIOLOGICAL ACTIVITY

Vallapin (0.6 mg) caused 80% inhibition of boll weevils (*J. Nat. Prod.* 1991, *54,* 286).

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HERNANDIA (Hernandiaceae)

H. ovigera L. syn. *H. peltata* Meissn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 377).

(-)Dimethylmatairesinol and 5'-methoxypodorhizol isolated from seeds (*Chem. Pharm. Bull.* 1991, *39,* 1873); 6,7-demethylene-desoxypodophyllotoxin isolated from seeds from Taiwan and its structure established; in addition, desoxypodophyllotoxin, podophyllotoxin, 1,2,3,4-dehydro-desoxypodophyllotoxin, dehydropodophyllotoxin, bursehernin and podorhizol isolated (*Chem. Pharm. Bull.* 1992, *40,* 1318).

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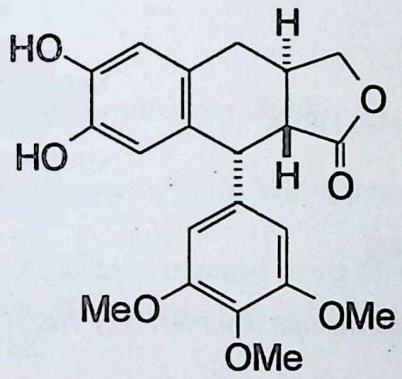

6,7-Demethylene-desoxypodophyllotoxin

H. peltata Meissn.; see *H. ovigera* L.

HERNIARIA (Illecebraceae)

H. glabra L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 340).

Two new glycosides of medicagenic acid - herniaria saponins 1 and 2 - isolated and characterised (*Pharmazie* 1993, *48,* 450; *Chem. Abstr.* 1994, *121,* 175118 p); herniaria saponin 3 isolated and its structure elucidated (*Phytochemistry* 1993, *34,* 1609).

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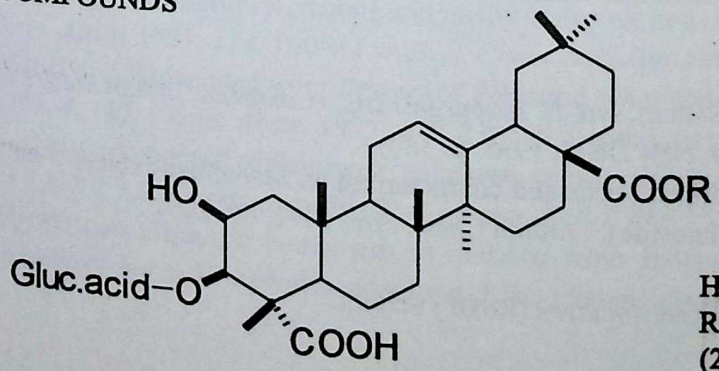

Herniaria saponin 1
R = Fucose(3,4-di-Ac)
(2→1)Rha(3→1)Glu

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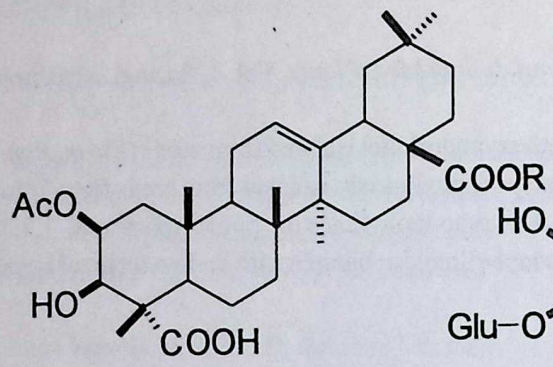
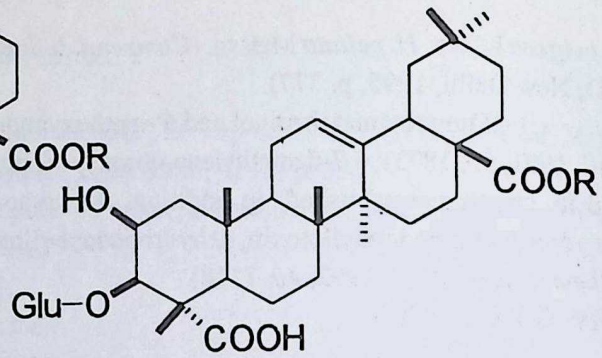


Herniaria saponin 2
R = Glu[(2→1)Glu](6→1)Glu(4→1)Rha



Herniaria saponin 3
R = Fucose(4-Ac)[(2→1)Rha(3→1) Glu](3→1)Glu

HERPESTIS (Scrophulariaceae)

H. monniera (L.) H.B. & K.; see *Bacopa monnieri* (L.) Wettst.

HESPERETHUSA (Rutaceae)

H. crenulata (Roxb.) M. Roem.; see *Naringi crenulata* (Roxb.) Nicolson

HETEROPAPPUS (Asteraceae)

H. altaicus (Willd.) Novopkr.; see *Aster altaicus* Willd.

HETEROPHRAGMA (Bignoniaceae)

H. adenophyllum Seem. ex Benth. & Hook.; see *Fernandoa adenophylla* (Wall. ex G. Don) V. Steenis

H. quadriloculare (Roxb.) Schum. syn. *H. roxburghii* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 380).

A saponin isolated from seeds and characterised as 24-methyl-cholest-5-en-3-O-α-L-glucosyl(1→4)-O-β-L-rhamnoside (*J. Indian Chem. Soc.* 1992, *69*, 286).

H. roxburghii DC.; see *H. quadriloculare* (Roxb.) Schum.

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HEVEA (Euphorbiaceae)

H. brasiliensis (H.B. & K.) Muell.-Arg. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 342).

Freshly-tapped latex contained deoxyribonuclease (*Proc. Malays. Biochem. Soc. Conf.* 1989, 14th, 12; *Chem. Abstr.* 1990, *113,* 112455 k).

HEYNEA (Meliaceae)

H. trijuga Roxb. ex Sims.; see *Trichilia connaroides* (Wt. & Arn.) Bentvelzen

HIBISCUS (Malvaceae)

H. abelmoschus L.; see *Abelmoschus moschatus* Medik.

H. cannabinus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 381).

Purified pectic acid isolated from unretted mesta fibres contained backbone of (1→4)-linked galacturonic acid residues (78.0), arabinose (3.6), rhamnose (3.0) and galactose (1.2%) (*Indian J. Chem.* 1990, *29*B, 188).

H. mutabilis L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 343).

Flowers afforded nonacosane, β-sitosterol, betulinic acid, hexyl stearate, stigmasta-3,7-dione, stigmast-4-en-3-one, tetratriacontanol, quercetin and kaempferol (*Zhongcaoyao* 1993, *24,* 227; *Chem. Abstr.* 1993, *119,* 113385 y).

H. rosa-sinensis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 381).

Isolation and structure elucidation of β-rosasterol from Chinese plant (*Zhongcaoyao* 1991, *22,* 3; *Chem. Abstr.* 1991, *114,* 244254 z); methyl (R)2-hydroxysterculate isolated from root bark along with methyl sterculate and methy malvalate and characterised (*Chem. Lett.* 1991, 47; *Chem. Abstr.* 1991, *114,* 160744 w; *Bull. Chem. Soc. Jpn.* 1991, *64,* 3084); two cyclopeptide alkaloids (I and II) isolated from flowers of Pakistani plant and their structures proposed (*Sci. Ind.* 1992, *4,* 147; *Chem. Abstr.* 1993, *118,* 230140 e); hibiscus mucilage RL contains an acidic polysaccharide composed of rhamnose, galactose, galacturonic acid and glucuronic acid in molar ratio of 5.0:8.0:3.0:2.0 respectively (*Biol. Pharm. Bull.* 1993, *16,* 735; *Chem. Abstr.* 1994, *120,* 212550 a); two aliphatic enone ethers isolated from roots and characterised as methyl (E)11-methoxy-9-oxo-10-nonadecenoate and (E)10-methoxy-8-oxo-9-octadecenoate; in addition,

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methyl sterculate, methyl malvalate and methyl (R)2-hydroxysterculate isolated (*Phytochemistry* 1994, *35*, 1245).

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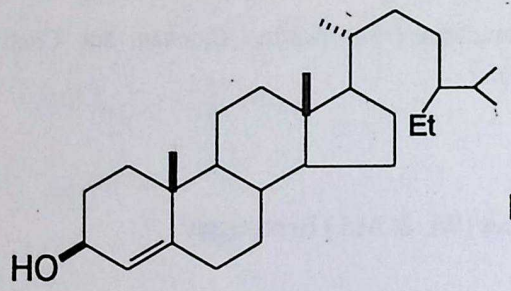
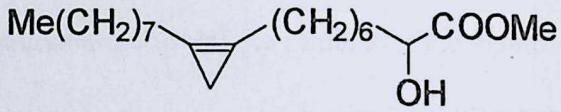
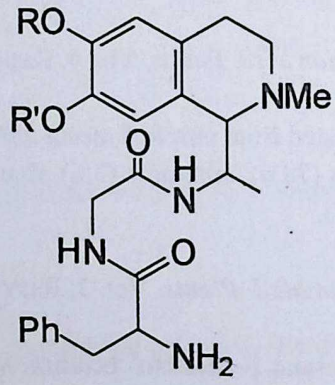


β-Rosasterol



Methyl (R)2-hydroxysterculate



I
R = H, R' = Me
II
R = Me, R' = H

BIOLOGICAL ACTIVITY

Hibiscus mucilage RL showed considerable anticomplementary activity (*Biol. Pharm. Bull.* 1993, *16*, 735; *Chem. Abstr.* 1994, *120*, 212550 a).

H. sabdariffa L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 343).

Alcoholic extract of flowers inhibited *in vitro* angiotensin I-converting enzyme and to lesser degree elastase, trypsin and α-chymotrypsin; *in vivo* angioprotective effects in rats were apparently due to presence of flavones and anthocyanins (*J. Pharm. Belg.* 1990, *45*, 120; *Chem. Abstr.* 1990, *113*, 70966 v).

A pigment isolated from calyxes and its structure established as delphinidin-3-O-β-D-xylopyranosyl(1→2)-β-D-glucopyranoside (*Shokuhin Eiseigaku Zasshi* 1991, *32*, 301; *Chem.*

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Abstr. 1992, *116,* 80491 n); determination of linoleic (43.2), oleic (24.7), palmitic (17.2), sterculic (2.1), linolenic (1.2%) and myristic, palmitoleic, epoxyoleic, stearic, malvalic, dihydrosterculic and eicosenoic acids (<1.0% each) in seed oil by GC-MS (*J. Agric. Food Chem.* 1992, *40,* 1186; *Chem. Abstr.* 1992, *117,* 46818 k); sepals contained delphinidin-3-O-sambubioside, cyanidin-3-O-glucopyranoside, quercetin, myricetin, hibiscetin, hibiscitrin and o-coumaric and p-coumaric acids (*Rastit. Resur.* 1993, *29,* 31; *Chem. Abstr.* 1994, *120,* 4596 t).

H. syriacus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 382).

Taxifolin-3-O-β-D-glucopyranoside, herbacetin-7β-D-glucopyranoside and kaempferol-3α-L-arabinosido-7α-L-rhamnopyranoside isolated from petals whereas leaves afforded saponaretin and saponarin (*Khim. Prir. Soedin.* 1990, 552; *Chem. Abstr.* 1991, *114,* 139773 v); bark contained azelaic acid, suberic acid, 1-octacosanol, β-sitosterol, docosanediol, betulin and erythrotriol (*Zhongguo Zhongyao Zazhi* 1993, *18,* 37; *Chem. Abstr.* 1993, *118,* 187847 b).

HIPPOCRATIA (Hippocrateaceae)

H. grahamii Wt.; see *Reissantia grahamii* (Wt.) Ding Hou

H. indica Willd.; see *Reissantia indica* (Willd.) Halle

HIPPOPHAE (Elaegnaceae)

H. rhamnoides L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 382).

Total flavones inhibited contraction of isolated rabbit aortic preparation induced by KCl, $CaCl_2$ and noradrenaline. It also reduced Ca^{2+}-dependent contraction in aortic preparation (*Xi'an Yike Daxue Xuebao* 1990, *11,* 332; *Chem. Abstr.* 1991, *115,* 21960 w); total flavones inhibited oscillatory after-potentials and decreased rate of spontaneous electrical activity induced by ouabain, shortened action potential duration of 50% repolarisation and reduced contractile force in guinea pig papillary muscles, thereby indicating that they possess antiarrhythmic activity (*Xi'an Yike Daxue Xuebao* 1992, *13,* 343; *Chem. Abstr.* 1993, *118,* 116456 n); seed oil markedly protected against liver damage induced by CCl_4, acetaminophen and EtOH. Seed oil (4.75 g/kg) also lowered SGPT levels and blocked depletion of GSH in damaged liver (*Zhonghua Yufang Yixue Zazhi* 1992, *26,* 227; *Chem. Abstr.* 1993, *118,* 94288 e); cardiac performance and haemodynamics of normal human subjects observed after oral administration of total flavones; strengthening of myocardial contractility and pump function of heart, reduction of total peripheral vascular resistance and increase in vascular elasticity were observed (*Xi'an Yike Daxue Xuebao* 1993, *14,* 138; *Chem. Abstr.* 1993, *119,* 151873 p).

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15,16-Epoxy-9,12-octadecadienoic acid as major constituent along with mono and dihydroxy acids and epoxyacids identified in seed oil by GC-MS (*Khim. Prir. Soedin.* 1989, 626; *Chem. Abstr.* 1990, *112,* 115754 x); determination of linolenic acid (18.5%) in seed oil by GC-MS (*Jilin Daxue Ziran Kexue Xuebao* 1990, 117; *Chem. Abstr.* 1991, *114,* 5060 b); leaves afforded two new tannins - hippophaenins A and B - along with hyperin, tiliroside,1,2,6-tri-O-galloyl-β-D-glucose, pendunculagin, casuarictin, casuarinin, strictinin, isostrictinin, tellimagrandin I, stachyurin, stalagin and vescalagin whereas fruits contained 3,4-dihydroxybenzoic and p-coumaric acids (*Phytochemistry* 1991, *30,* 663); isolation of 2α-hydroxyoleanolic and 2α-hydroxyursolic acids as their methyl esters from leaves (*Sib. Khim. Zh.* 1992, 92; *Chem. Abstr.* 1992, *117,* 66605 s); essential amino acids (lysine, threonine, methionine, valine and isoleucine) accounted for 36.45% of total amino acids in red fruits; corresponding value for yellow fruit was 39.31%. Essential amino acids accounted for 9.29 and 11.79% of red and yellow fruits respectively. Corresponding values of essential amino acids (threonine, methionine, valine, phenylalanine, isoleucine and leucine) in seeds of red and yellow fruits were 16.72 and 22.94% respectively of total seed amino acids (*Rastit. Resur.* 1992, *28,* 75; *Chem. Abstr.* 1993, *118,* 253702 d); isolation of (–)quebrachitol from roots and its crystal structure determination (*J. Chin. Chem. Soc.* 1994, *41,* 115; *Chem. Abstr.* 1994, *120,* 187243 t).

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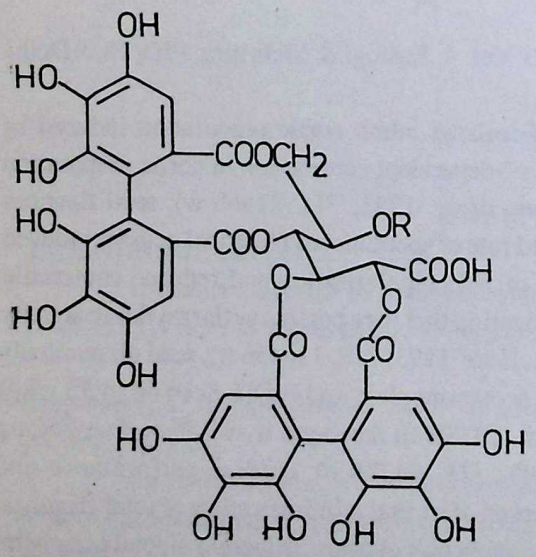
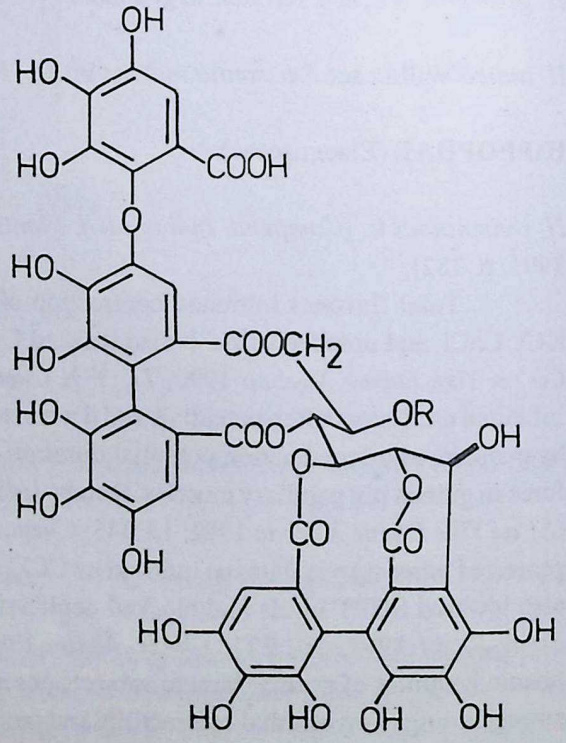


Hippophaenin A
R = Galloyl



Hippophaenin B
R = Galloyl

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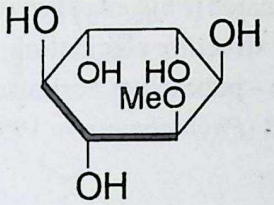


(-)Quebrachitol

HIPTAGE (Malpighiaceae)

H. benghalensis (L.) Kurz syn. *H. madablota* Gaertn. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 216).

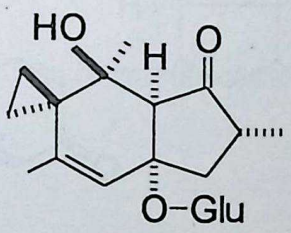
Isolation of friedelin, epifriedelinol, octacosanol, α-amyrin, β-sitosterol and its glucoside from stem and stem bark (*Arogya* 1989, *15,* 165).

H. madablota Gaertn.; see *H. benghalensis* (L.) Kurz

HISTIOPTERIS (Dennstaedtiaceae)

H. incisa (Thunb.) J.Sm. syn. *Litobrachia incisa* Presl, *L. aurita* Bedd.

A sesquiterpenoid carcinogen - ptaquiloside - isolated (*Phytochemistry* 1990, *29,* 1475).
Distribution: Throughout India in hilly regions.
NEW COMPOUNDS



Ptaquiloside

HOLARRHENA (Apocynaceae)

H. antidysenterica (Roth) DC. syn. *H. pubescens* Wall. ex Buch.-Ham. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 383).

Three new steroidal alkaloids - regholarrhenines D, E and F - isolated from stem bark along with kurcholessine, conessine, conessimine and isoconessimine and structures of new compounds established (*Phytochemistry* 1990, *29,* 969); isolation of kurchilidine and kurchamide from bark and determination of their structures; regholarrhenine A also isolated (*Heterocycles*

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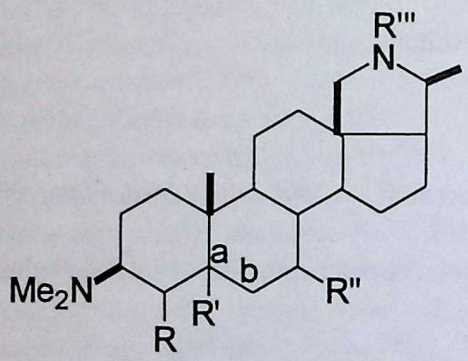
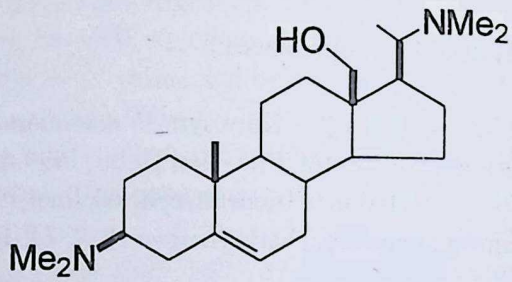
1993, *36,* 717); bark also afforded kurchinidine, holadiene and a new androstane derivative - kurchinin - and their structures elucidated (*Phytochemistry* 1993, *33,* 925); isolation of kurchinicin and kurchinine from bark and their structure elucidation; holadyson also isolated (*J. Nat. Prod.* 1994, *57,* 27); three more alkaloids - pubescine, norholadiene and pubescimine - isolated from bark and their structures established (*Phytochemistry* 1994, *36,* 1537).

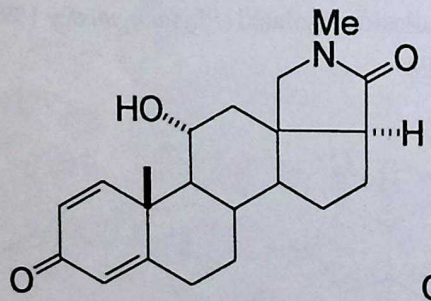
NEW COMPOUNDS



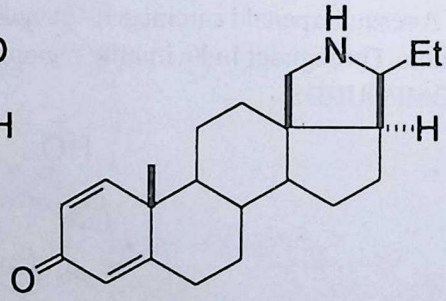
Regholarrhenine D
R,R',R'' = H, R''' = OH, ab = Δ
Regholarrhenine E
R = α-Me, R',R'' = α-OH, R''' = Me



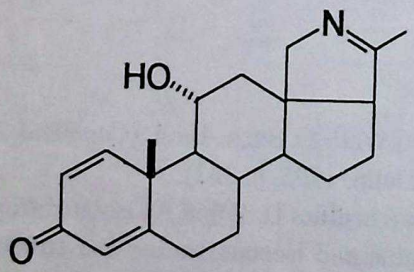
Regholarrhenine F



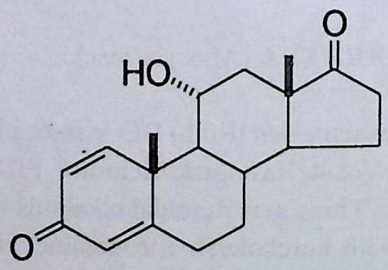
Kurchamide



Kurchilidine



Kurchinine



Kurchinin

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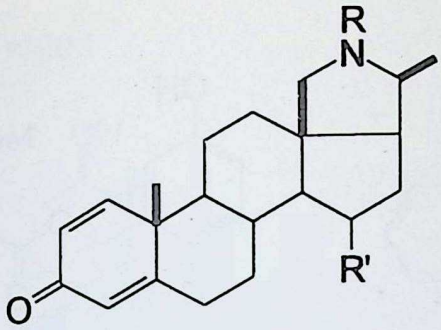
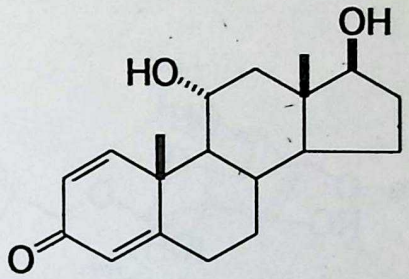
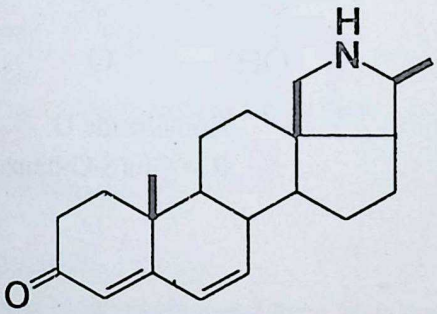
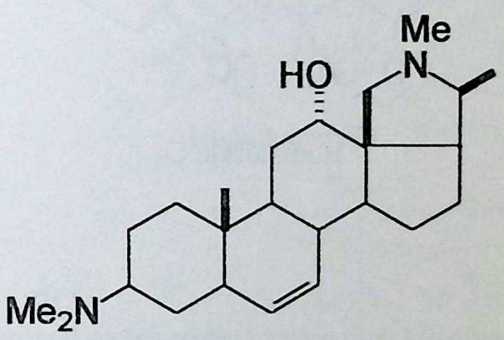




Kurchinidine
R = H, R' = α-OH
Holadiene
R = Me, R' = H
Norholadiene
R,R'= H

Kurchinicin





Pubescine

Pubescimine

H. pubescens Wall. ex Buch.-Ham.; see *H. antidysenterica* (Roth) DC.

HOMALIUM (Flacourtiaceae)

H. ceylanicum (Gardn.) Benth.

Two new benzenoid glucosides - homaloside A and homaloside D - and 1-hydroxy-6-oxocyclohex-2-enoic acid methyl ester (I) isolated and their structure established; vacciniin also isolated (*J. Nat. Prod.* 1993, *56*, 699); isolation and characterisation of homaloside B and homaloside C; 6-O-(3,4-dimethoxycinnamoyl)catalpol (II) and 3-hydroxy-β-ionyl-β-D-glucopyranoside (III) together with salireposide and salirepin also isolated (*Phytochemistry* 1993, *32*, 747).

Distribution: Assam.

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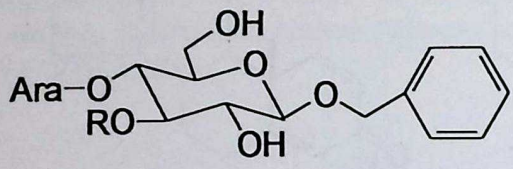
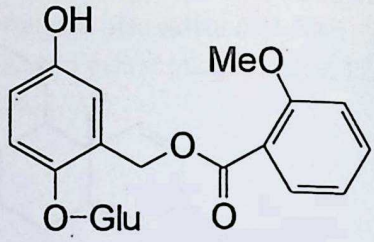
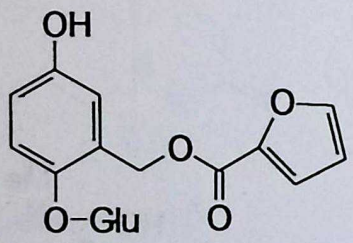


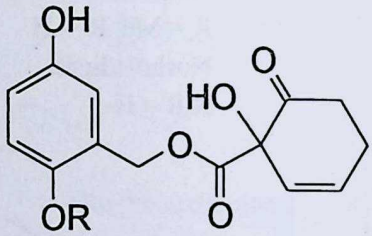
Homaloside A
R = Benzoyl



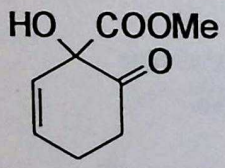
Homaloside B



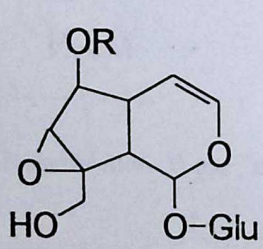
Homaloside C



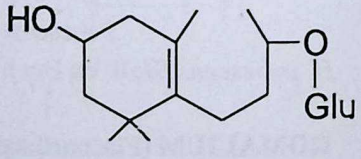
Homaloside D
R = Glu(6-O-benzoyl)



I



II
R = 3,4-Dimethoxycinnamoyl



III.

HOMALOMENA (Araceae)

H. aromatica (Roxb.) Schott (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 384).

New sesquiterpenoids - homalomenol A, homalomenol B and 1β,4β,7α-trihydroxyeudesmane - isolated from roots together with oplopanone, oplodiol and bullatantriol and structures of new compounds established (*Phytochemistry* 1992, *31,* 3615); roots also afforded homalomenol C and homalomenol D whose crystal structures determined; (–)α-cadinol and (–)T-murrolol also isolated (*Phytochemistry* 1992, *31,* 1659).

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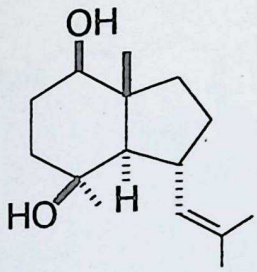
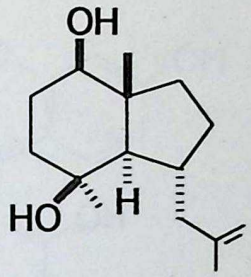
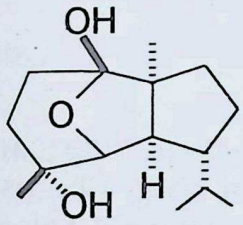


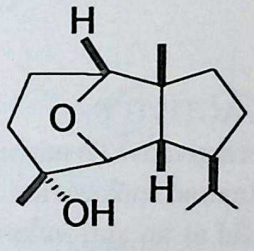
Homalomenol A



Homalomenol B



Homalomenol C



Homalomenol D

HOPPEA (Gentianaceae)

H. fastigiata (Griseb.) Clarke

A new xanthone isolated from aerial parts and roots and characterised as 1,7-dihydroxy-3,5-dimethoxyxanthone (*J. Indian Chem. Soc.* 1990, *67,* 1003; *Int. J. Pharmacog.* 1991, *29,* 225; *Chem. Abstr.* 1992, *116,* 231880 s); another xanthone, 1,5,7-trihydroxy-3-methoxyxanthone, isolated and its structure elucidated (*Phytochemistry* 1991, *30,* 1036); isolation of one more xanthone from aerial parts and roots and its characterisation as 1,5-dihydroxy-3,7-dimethoxy-xanthone (*Int. J. Pharmacog.* 1994, *32,* 201; *Chem. Abstr.* 1994, *121,* 251227 r).
Distribution: Peninsular India.

HORSFIELDIA (Myristicaceae)

H. amygdalina (Wall.) Warb. syn. *Myristica amygdalina* Wall.

Khasi - Dieng-soh-jodao, Dieng-ja-lyntep; Garo - Bolchok-pok; Mikir - Dettakarong, Pran-dang-arong; Nagaland - Ching-liang-pai.

A flavan derivative (I) isolated from fruits (Jpn. 4,46,172 (1992) Feb. 17; *Chem. Abstr.* 1992, *117,* 14406 h).
Distribution: Assam, Meghalaya and other parts of north-eastern India.

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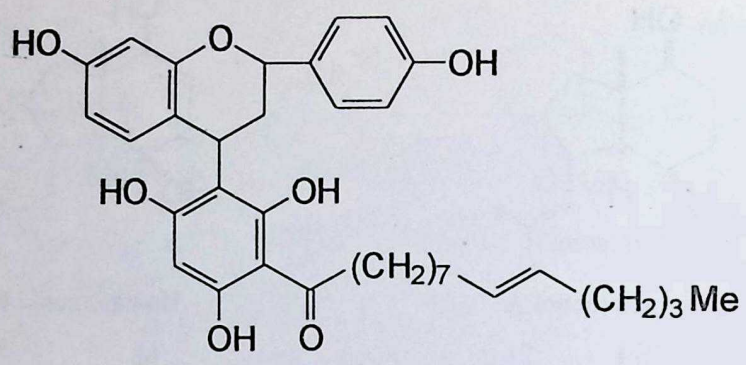

I

BIOLOGICAL ACTIVITY

Flavan derivative (I) inhibited phospholipase A2 *in vitro* (IC50 7.5 μM) and biosynthesis of prostaglandins and leukotrienes. It inhibited ear oedema in rabbits with ED50 of 24.0 μg/ear. Thus, it is useful as an anti-inflammatory and antiallergic agent with little side effects (Jpn. 4,46,172 (1992) Feb. 17; *Chem. Abstr.* 1992, *117,* 14406 n).

HOUTTUYNIA (Saururaceae)

H. cordata Thunb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 347).

Plant extract showed potent antiplatelet and cytotoxic activities (*J. Chin. Chem. Soc.* 1993, *40,* 301; *Chem. Abstr.* 1993, *119,* 135624 c).

Camphene, p-cymene, α- and β-pinenes, myrcene, limonene, linalool, geraniol, borneol, bornyl acetate, β-caryophyllene, humulene, thymol, octanal, decanal, dodecanal, 2-undecanone and decanoic, dodecanoic, tetradecanoic and hexadecanoic acids identified in aerial parts of Korean plant (*Punsok Kwahak* 1988, *1,* 57; *Chem. Abstr.* 1992, *117,* 239582 n); aerial parts of Korean plant also afforded quercetin, rutin, hyperin and isoquercitrin (*Anal Sci. Technol.* 1991, *4,* 285; *Chem. Abstr.* 1992, *117,* 219828 u); isolation of aristolactam AII, cepharanone B, norcepharadione B and piperolactam A (*Planta Med.* 1992, *58,* 568); two pyridine alkaloids (I and II) and 7-chloro-6-demethylcepharadione B along with cepharanone B and cepharadione B isolated (*J. Chin. Chem. Soc.* 1993, *40,* 301; *Chem. Abstr.* 1993, *119,* 135624 c); 1,3,5-tridecanoylbenzene, caryophyllene oxide, sesamin, methyl 4-hydroxybenzoate, vomifoliol (blumenol A), quercetin-3-O-β-L-rhamnoside and a steroid mixture isolated from aerial parts; stereochemistry of vomifoliol determined by X-ray studies (*J. Chin. Chem. Soc.* 1993, *40,* 399; *Chem. Abstr.* 1994, *120,* 101908 d); isolation and characterisation of 3,5-didecanoyl-4-nonyl-1,4-dihydropyridine, 3-decanoyl-4-nonyl-5-dodecanoyl-1,4-dihydropyridine, 3-decanoyl-6-nonylpyridine, 3,5-didecanoylpyridine and 1,3,5-tridecanoylbenzene (*Nat. Prod. Lett.* 1994, *4,* 235; *Chem. Abstr.* 1994, *121,* 251195 d).

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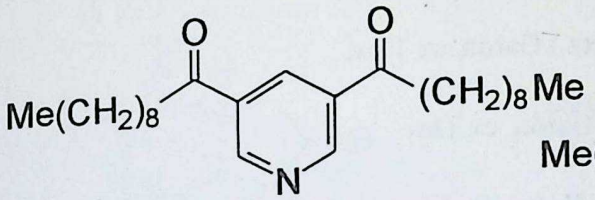

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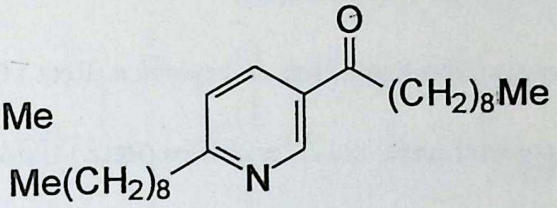
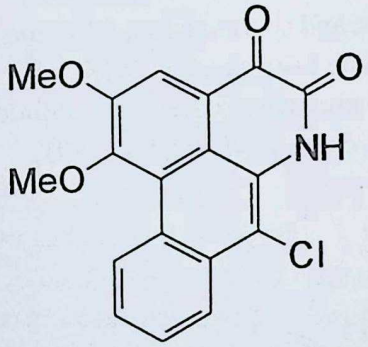
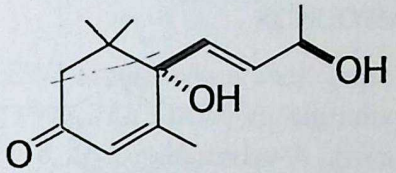


II



7-Chloro-6-demethylcepharadione B



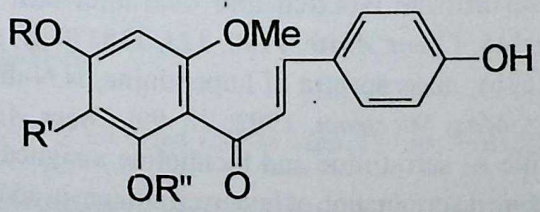
Vomifoliol

HUMULUS (Moraceae)

H. lupulus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 386).

7,7-Dimethyl-6,8-dioxabicyclo[3.2.1]octane synthesised (*Synth. Commun.* 1989, *19,* 2815; *Chem. Abstr.* 1990, *112,* 138809 n); isolation of two new chalcone derivatives (I and II) along with isoxanthohumol and xanthohumol; structures of a new compounds determined (*Kawasaki Med. J.* 1990, *16,* 117; *Chem. Abstr.* 1992, *116,* 11088 z); humulone isolated but on keeping in dark underwent auto-oxidation to tricyclooxyisohumulone (*Planta Med.* 1991, *57,* 498).

NEW COMPOUNDS



I

R = Me, R' = $CH_2CH{=}CMe_2$, R" = H

II

R,R' = H, R" = Me

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HUNTERIA (Apocynaceae)

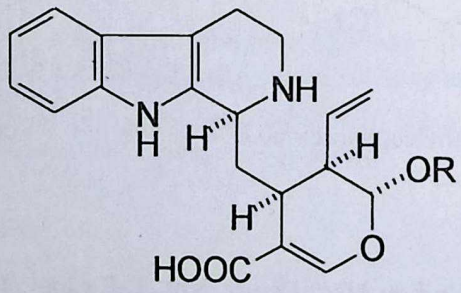
H. corymbosa Roxb.; see *H. zeylanica* (Retz.) Gardn. ex Thw.

H. legocii Livera; see *H. zeylanica* (Retz.) Gardn. ex Thw.

H. zeylanica (Retz.) Gardn. ex Thw. syn. *H. legocii* Livera, *H. corymbosa* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 386).

Chiral synthesis of eburnamine, eburnamenine and eburnamonine (*J. Chem. Soc.* Perkin 1 1985, 305); stereoselective synthesis of eburnamonine (*Tetrahedron* 1994, *50,* 9487); a new glycosidic indole alkaloid - hunterioside - isolated and characterised as strictosidinic acid - 6'-α-D-glucoside; strictosidinic acid also isolated (*Chem. Pharm. Bull.* 1994, *42,* 991).

NEW COMPOUNDS



Hunterioside
R = Glu(6→1)Glu

HUPERZIA (Lycopodiaceae)

H. serrata (Thunb.) Rothm. syn. *Lycopodium serratum* Thunb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 386).

Serratin and serratinine isolated and characterised; lycodoline also obtained (*Zhongcaoyao* 1990, *21,* 146; *Chem. Abstr.* 1990, *113,* 138370 d); synthesis of huperzine A (*J. Org. Chem.* 1991, *56,* 4636); mass spectra of huperzinine, N,N-dimethylhuperzine A and N-methylhuperzine B (*Org. Mass Spectrom.* 1992, *27,* 99; *Chem. Abstr.* 1992, *116,* 194667 e); NMR spectra of huperzine A, serratinine and lucidioline assigned (*Phytochemistry* 1993, *34,* 1425); isolation and structure determination of huperserratinine; in addition huperzine A, huperzine B, serratinine, lucidioline and lycodoline isolated (*Phytochemistry* 1994, *36,* 1069).

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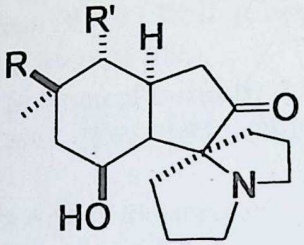
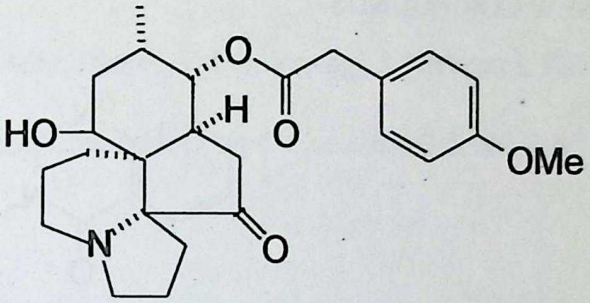


Serratin
R = OH, R' = H
Serratinine
R = H, R' = OH



Huperserratinine

BIOLOGICAL ACTIVITY

Huperzine A (0.1 mg/kg, i.v.) produced EEG arousal via a cholinergic mechanism (*Zhongguo Yaoli Xuebao* 1989, *10,* 496; *Chem. Abstr.* 1990, *112,* 132390 k); huperzine A markedly inhibited acetylcholinesterase (*J. Org. Chem.* 1991, *56,* 4636); huperzine A, given i.m. or i.p., inhibited cholinesterase activity in central cholinergic system of rat. It produced long-term (upto 6 hr) inhibition of acetylcholine levels upto 40% at 1 hr (*J. Neurosci. Res.* 1989, *24.* 276; *Chem. Abstr.* 1990, *112,* 537 m).

HYDNOCARPUS (Flacourtiaceae)

H. laurifolia (Dennst.) Sleummer; see *H. pentandra* (Buch.-Ham.) Oken

H. pentandra (Buch.-Ham.) Oken syn. *H. laurifolia* (Dennst.) Sleummer, *H. wightiana* Blume (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 387).

Ursolic, betulinic, acetylbetulinic and acetylursolic acids isolated from stem bark; first three acids also detected in leaves (*Fitoterapia* 1993, *64,* 282).

H. wightiana Blume; see *H. pentandra* (Buch.-Ham.) Oken

HYDRANGEA (Hydrangeaceae)

H. macrophylla (Thunb.) Ser. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 350).

Cis- and trans-febrifugines isolated from leaves and calyxes (*Shoyakugaku Zasshi* 1990, *44,* 288; *Chem. Abstr.* 1991, *115,* 64012 f); determination of phyllodulcin (52.0) and hydrangenol (47.0%) in leaves by HPLC (*Seikatsu Kagaku Kenkyusho Kenkyu Hokoku* 1992, *24,* 1; *Chem. Abstr.* 1992, *117,* 44623 u); hydrangenol, its 8-O-glucoside, 8-O-galactoside and 4'-O-glucoside isolated from leaves (*Zhongguo Zhongyao Zazhi* 1994, *19,* 293; *Chem. Abstr.* 1994, *121,* 175150 t).

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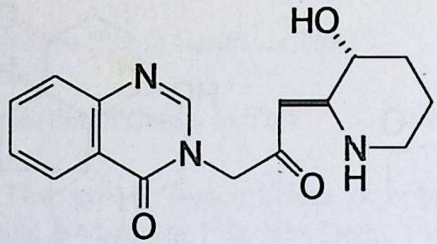

Febrifugine

BIOLOGICAL ACTIVITY

Trans-febrifugine showed anticoccidial activity in chicken whereas cis-isomer was devoid of activity even at concentration of 25 times the ED of trans-isomer (*Shoyakugaku Zasshi* 1990, *44*, 288; *Chem. Abstr.* 1991, *115*, 64012 f).

HYDROCOTYLE (Apiaceae)

H. asiatica L.; see *Centella asiatica* (L.) Urban

HYMENOCALLIS (Amaryllidaceae)

H. littoralis (Jacq.) Salis. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 351).

Bulbs of plant collected in Hawaii contained 7-deoxy-trans-dihydronarciclasine along with pancratistatin, narciclasine and 7-deoxynarciclasine (*J. Nat. Prod.* 1993, *56*, 1682).

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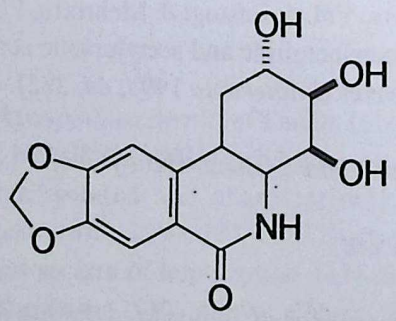

7-Deoxy-trans-dihydronarciclasine

BIOLOGICAL ACTIVITY

7-Deoxy-trans-dihydronarciclasine, pancratistatin, narciclasine and 7-deoxynarciclasine showed *in vitro* cytotoxicity at 12.6 to 145.0 nM against 60 human cell lines comprising NCI panel (*J. Nat. Prod.* 1993, *56*, 1682).

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HYMENODICTYON (Rubiaceae)

H. excelsum (Roxb.) Wall. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 388).

Isolation of β-sitosterol and stigmasterol from bark (*J. Inst. Chemists,* Calcutta 1993, *65,* 57; *Chem. Abstr.* 1994, *120,* 265796 s).

HYOSCYAMUS (Solanaceae)

H. albus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 388).

A new piperidone alkaloid - hyalbidone - isolated from hairy roots infected with *Agrobacterium rhizogenes* and its structure established; hyoscyamine, 6β-hydroxyhyoscyamine, 7β-hydroxyhyoscyamine, scopolamine, littorine, tropine, ψ-tropine and tropinone also isolated (*Phytochemistry* 1991, *30,* 2977); 4'-hydroxylittorine (3α-(p-hydroxyphenyl)lactoyloxytropane) and two isomeric forms of N-methylpyrrolidinyl-cuscohygrine along with 3-propionyloxytropane, 3-isobutyryloxytropane, 3β-tigloyloxynortropane and 6-hydroxy-3-phenylacetoxytropane isolated (*Phytochemistry* 1994, *35,* 107).

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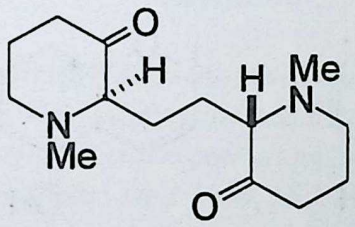

Hyalbidone

HYPERICUM (Hypericaceae)

H. calycinum L.

A new phloroglucinol derivative (I) isolated from aerial parts and its structure established (*Planta Med.* 1991, *57,* 548); leaves afforded quercetin, hyperoside, luteolin and rutin (*Fitoterapia* 1993, *64,* 92).

Distribution: Introduced into Indian gardens.

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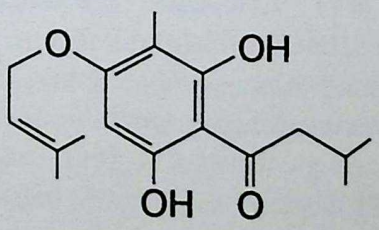

I

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BIOLOGICAL ACTIVITY

Phloroglucinol derivative (I) exhibited antifungal activity against *Cladosporium cucumerinum* and also *in vitro* antimalarial activity (*Planta Med.* 1991, *57,* 548).

H. japonicum Thunb. ex Murr. syn. *Triadenum japonicum* (Blume) Makino (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 390).

A new chromenecarbolactone - sarolactone - isolated and characterised (*Phytochemistry* 1990, *29,* 1010); isolation and structure elucidation of (2R,3R)taxifolin-7-rhamnoside; quercitrin and vincetoxicoside B also isolated (*Phytochemistry* 1991, *30,* 3152); whole plant afforded a dipeptide derivative - saropeptate - whose structure was elucidated as N-benzoyl-L-phenyl alanyl-L-phenylalaninol acetate; its absolute configuration determined by synthesis (*Phytochemistry* 1991, *30,* 3639); an isopentenylated flavonol - sarothranol - isolated together with isojacareubin and structure of former established (*Phytochemistry* 1993, *32,* 1583); whole plant contained two phloroglucinol derivatives - sarothralen C and sarothralen D - whose structures determined (*Phytochemistry* 1994, *35,* 469); sarothralin G also isolated and characterised (*Planta Med.* 1990, *56,* 274).

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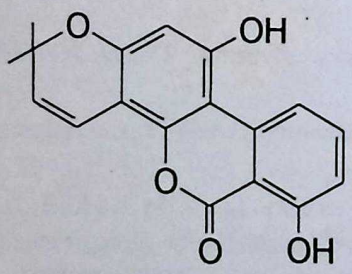
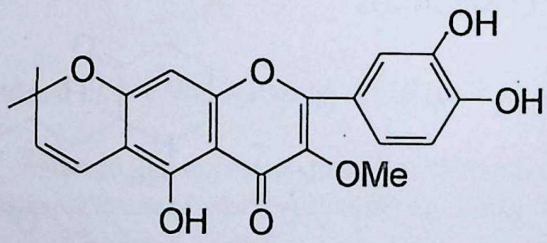
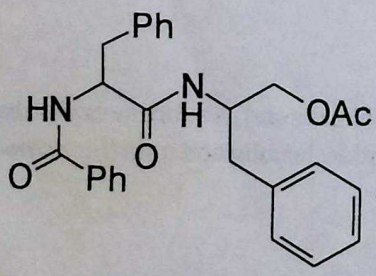


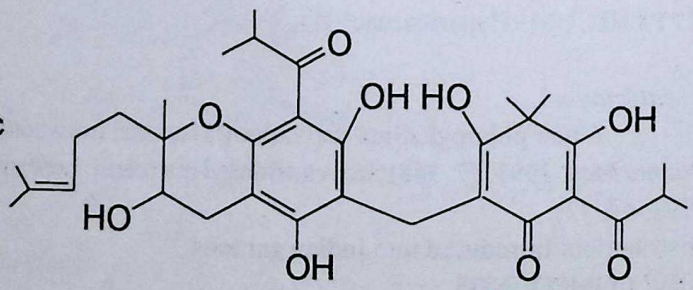
Sarolactone



Sarothranol



Saropeptate



Sarothralen C

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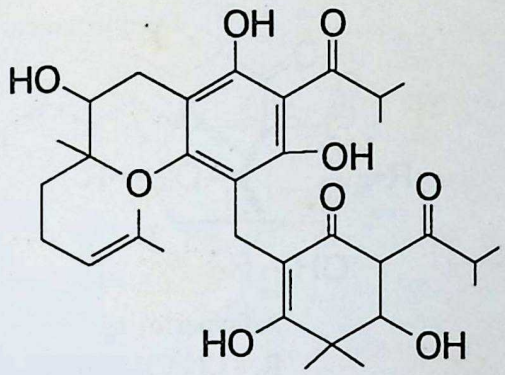
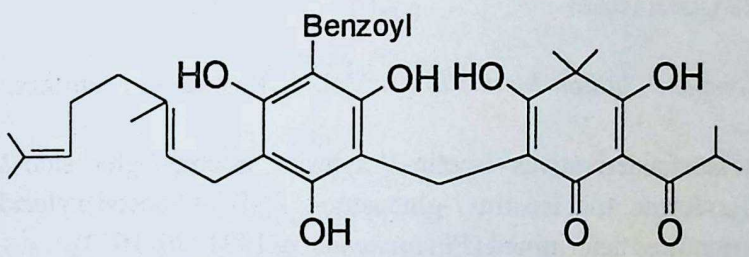


Sarothralen D



Sarothralin G

BIOLOGICAL ACTIVITY

Sarothralen C and sarothralen D showed antimicrobial activity against *Staphylococcus aureus* (*Phytochemistry* 1994, *35*, 469); sarothralin G exhibited significant activity against Gram +ve bacteria, *Staphylococcus aureus*, *Bacilllus cereus* and *Nocardia gardneri*, which was more than that of sarothralens A and B (*Planta Med.* 1990, *56*, 274).

H. mysorense Wt. & Arn. (*mysurense*) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 392).

Ethanolic extract inhibited ringworm fungus, *Trichophyton mentagrophytes*.

An active principle - 3(1,1-dimethyl-2-propenyl)-4-methoxy-6-phenyl-2H-pyran-2-one - isolated and characterised (*Indian Drugs* 1989, *26*, 678).

H. perforatum L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 394).

Plant extract containing flavonoids was shown *in vitro* tests to be devoid of mutagenic activity (*Arzneim.-Forsch.* 1990, *40*, 851; *Chem. Abstr.* 1990, *113*, 145279 j).

Adhyperforin isolated from flowers and fruits and its structure established (*Planta Med.* 1992, *58*, 291); in addition to protopseudohypericin, pseudohypericin, protohypericin and hypericin, fresh buds and flowers afforded cyclopseudohypericin which was partially characterised (*PZ Wiss.* 1992, *5*, 169; *Chem. Abstr.* 1992, *117*, 230156 u); mangiferin, quercetin-3-O-glucuronide and quercetin-3-O-xyloside isolated (*Fitoterapia* 1992, *63*, 473).

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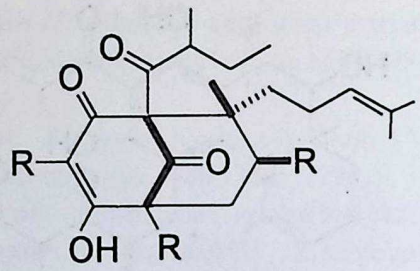

Adhyperforin
R = $CH_2CH{=}CMe_2$

HYPOCHOERIS (Asteraceae)

H. radicata L.(*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 394).

Four new isoetin derivatives - isoetin-2'-xyloside, isoetin-7-glucosido-2'-xyloside, isoetin-2'-β-D-(4"-acetyl)xyloside and isoetin-7-glucosido-2'-β-D-(4"-acetyl)xyloside - isolated from leaves and their structures determined (*Phytochemistry* 1991, *30,* 1673).

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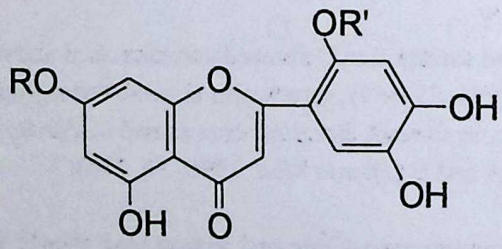

Isoetin-2'-xyloside
R = H, R' = Xyl
Isoetin-7-glucosido-2'-xyloside
R = Glu, R' = Xyl
Isoetin-2'-(4"-acetyl)xyloside
R = H, R' = Xyl(4-OAc)
Isoetin-7-glucosido-2'-(4"-acetyl)xyloside
R = Glu, R' = Xyl(4-OAc)

HYPOLEPIS (Hypolepidaceae)

H. punctata (Thunb.) Mett. ex Kuhn syn. *Dryopteris punctata* C.Chr. (excl. syn. *H. punctata* Bedd.) (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 383).

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Isolation of three new sesquiterpene glycosides - hypolosides A, B and C - and their structure elucidation (*Phytochemistry* 1990, *29*, 1475).
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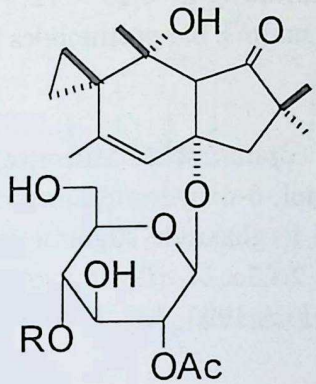

Hypoloside A
R = H
Hypoloside B
R = cis-p-Coumaroyl
Hypoloside C
R = trans-p-Coumaroyl

HYPOXIS (Amaryllidaceae)

H. orchioides Kurz; see *Curculigo orchioides* Gaertn.

HYPTIS (Lamiaceae)

H. capitata Jacq.; see *H. rhomboidea* Mart. & Gal.

H. pectinata (L.) Poit. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 396).

Three new 5,6-dihydro-α-pyrones - pectinolides A, B and C - isolated and their structures and absolute stereochemistry determined (*J. Nat. Prod.* 1993, *56*, 583).
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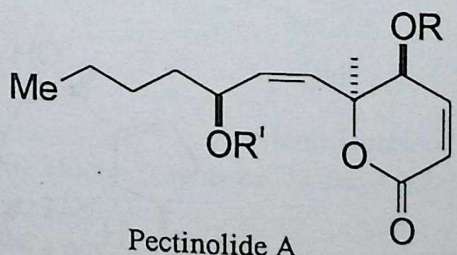

Pectinolide A
R,R' = Ac

Pectinolide B
R = Ac, R' = H
Pectinolide C
R = H, R' = Ac

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BIOLOGICAL ACTIVITY

Pectinolides A, B and C exhibited significant cytotoxicity (ED50 < 4.0 μg/ml) against a variety of tumor cell lines; pectinolide A at 6.25 - 12.5 μg/ml concentration inhibited *Staphylococcus aureus* and *Bacillus subtilis,* but pectinolides B and C were much less active (*J. Nat Prod.* 1993, *56,* 583).

H. rhomboidea Mart. & Gal. syn. *H. capitata* sensu Mukerjee (non Jacq.)

Isolation of ferruginol, sugiol, 6-dehydroroyleanone, kaempferol, its 3-O-rutinoside, quercetin-3-O-rutinoside, β-sitosterol, its glucoside, stigmasterol, its glucoside and betulic, ursolic, hyptadienic, 2α-hydroxyursolic and 2α,3α,24-trihydroxyolean-12-en-28-oic acids (*Zhonghua Yaoxue Zazhi* 1993, *45,* 61; *Chem. Abstr.* 1993, *119,* 221619 m).

Distribution: Bengal.

BIOLOGICAL ACTIVITY

2α,3α,24-Trihydroxyolean-12-en-28-oic acid showed significant cytotoxicity to human hepatoma cell line MS-G2 *in vitro* (*Zhonghua Yaoxue Zazhi* 1993, *45,* 61; *Chem. Abstr.* 1993, *119,* 221619 m).

H. suaveolens (L.) Poit. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 397).

The oil showed strong antimicrobial activity against *Staphylococcus aureus* (*Flavour Fragrance J.* 1990, *5,* 161; *Chem. Abstr.* 1990, *113,* 237642 a).

Determination of 1,8-cineole (32.5) and sabinene (15.0%) by GC in oil of plant grown in Netherlands (*Flavour Fragrance J.* 1990, *5,* 161; *Chem. Abstr.* 1990, *113,* 237642 a); aerial parts afforded hyptadienic acid whose structure determined (*Phytochemistry* 1990, *29,* 1326); sabinene (41.0), β-pinene (9.8), β-caryophyllene (7.9), limonene (6.8), caryophyllene oxide (5.8), ar-abietatriene (4.4), (Z)α-trans-bergamotol (2.0) and ar-abietatrienol (0.4%) determined by GC-MS in essential oil from aerial parts of plant collected in Kumaon region of India (*J. Essent. Oil Res.* 1992, *4,* 9; *Chem. Abstr.* 1993, *118,* 260785 m); 1,8-cineole (33.4%) determined as major component in essential oil of plant growing in Bangalore region (*J. Essent. Oil Res.* 1993, *5,* 321; *Chem. Abstr.* 1993, *119,* 91300 n); isolation and structure elucidation of guaia-1(2),7-dien-10-ol (I) and guaia-1(2),11-dien-10-ol (II) from leaf oil; guaia-1(5)-en-11-ol also obtained (*Fitoterapia* 1994, *65,* 186).

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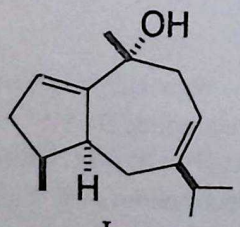

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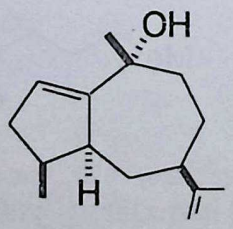

II

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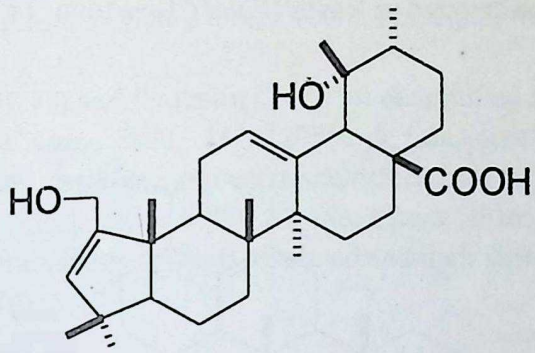

Hyptadienic acid

HYSSOPUS (Lamiaceae)

H. officinalis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 397).

Determination of isopinocamphone (38.1), pinocarvone (20.3), 1,8-cineole (12.2) and β-pinene (10.2%) in volatile oil from aerial parts (*Indian Perfum.* 1991, *35,* 49; *Chem. Abstr.* 1991, *115,* 99066 d).

ILEX (Aquifoliaceae)

I. aquifolium L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 397).

Structure of menisdaurin, isolated from ripe fruits, revised to (Z)1-cyanomethylene-4(R)hydroxy-6(S)-β-D-glucopyranosyloxy-2-cyclohexene (*Phytochemistry* 1990, *29,* 3934).

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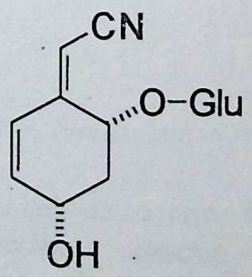

Menisdaurin

I. paraguariensis St. Hilaire (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 222).

Isolation of a new ursolic acid saponin - matesaponin I - from leaves and its structure elucidation (*J. Nat. Prod.* 1989, *52,* 1367); 3-caffeoylquinic acid and 3,5-dicaffeoylquinic acid,

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caffeine and theobromine detected in leaves (*Food Chem.* 1990, *35*, 13; *Chem. Abstr.* 1990, *112*, 75560 x).

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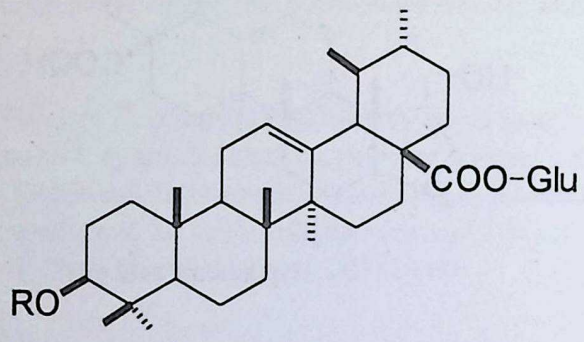

Matesaponin I ·
R = Ara(3→1)Glu

ILLICIUM (Illiciaceae)

I. anisatum L. syn. *I. religiosum* Sieb. & Zucc. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 386).

Enantiospecific synthesis of (–)shikimic acid (*Tetrahedron Lett.* 1994, *35*, 5505).

I. religiosum Sieb. & Zucc.; see *I. anisatum* L.

I. simonsii Maxim. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 398).

A new triphenyl-type sesquineolignan - simonsinol - and a new biphenylneolignan - isomagnolone - isolated from bark and their structures determined by 2D-NMR (*Chem. Pharm. Bull.* 1994, *42*, 112).

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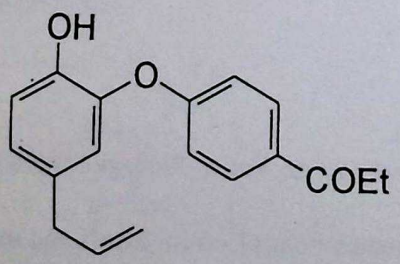
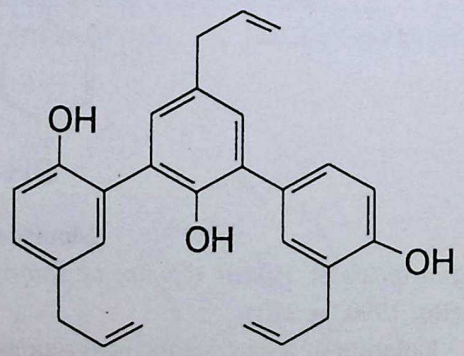


Isomagnolone



Simonsinol

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I. verum Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 398).

Trans-anethole (71.98) and feniculin (14.57%) determined in essential oil (*J. Essent. Oil Res.* 1990, *2,* 91; *Chem. Abstr.* 1990, *113,* 120590 r); trans-anethole (87.89%) along with limonene, feniculin, linalool, car-3-ene and estragole determined in volatile oil of fruits from plant grown in Shangyou (*Youji Huaxue* 1990, *10,* 183; *Chem. Abstr.* 1990, *113,* 3258 c); new convulsant compounds - veranisatins A and B - isolated and their structures determined (*Chem. Pharm. Bull.* 1993, *41,* 1670).

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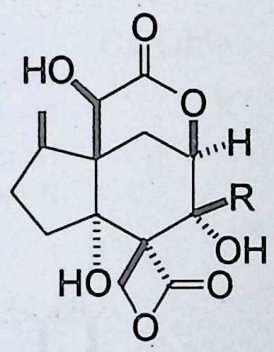

Veranisatin A
R = CH_2OMe
Veranisatin B
R = COOMe

BIOLOGICAL ACTIVITY

Veranisatins A and B exhibited convulsive effects and were lethal at a dose of 3.0 mg/kg, p.o, but at 1.0 mg/kg caused hypothermia without convulsions in mice (*Chem. Pharm. Bull.* 1993, *41,* 1670).

IMPATIENS (Balsaminaceae)

I. balsamina L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 398).

2-Methoxy-1,4-naphthoquinone isolated from whole plant (*Saengyak Hakhoechi* 1992, *23,* 240; *Chem. Abstr.* 1993, *119,* 124978 v); apigenin-4'-O-β-D-xylofuranosyl(1→4)-O-β-D-glucoside (0.086%) isolated (*Fitoterapia* 1992, *63,* 188); isolation and characterisation of a new anthraquinone from seeds (*Asian J. Chem.* 1993, *5,* 131; *Chem. Abstr.* 1993, *118,* 165190 e); five new baccharane glycosides - hosenkosides A, B, C, D and E - isolated from seeds and their structures determined (*Tetrahedron* 1994, *50,* 4973).

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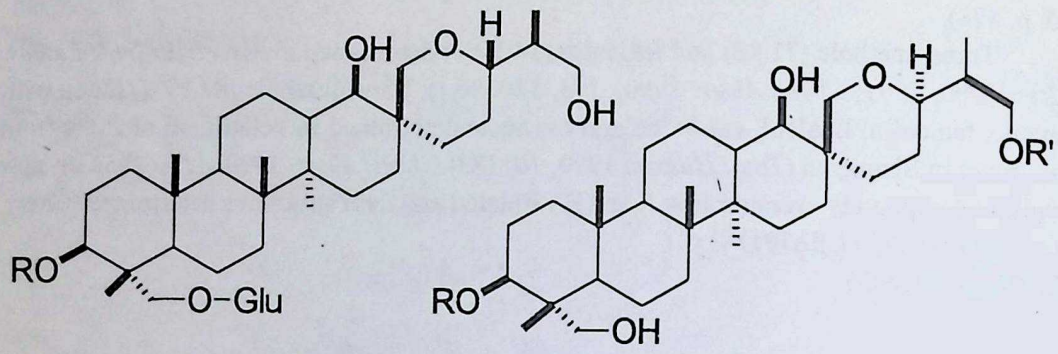
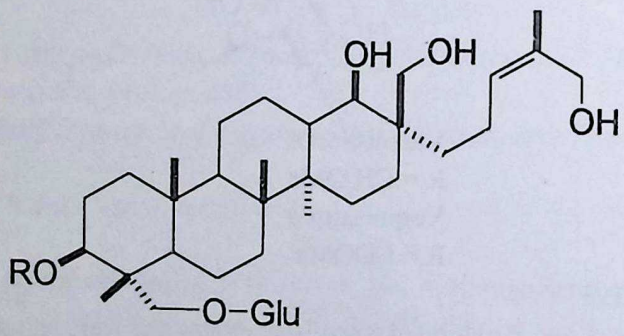


Hosenkoside A
R = Glu(2→1)Glu
Hosenkoside D
R = Glu

Hosenkoside B
R = Glu(2→1)Glu, R' = Glu
Hosenkoside E
R = Glu(2→1)Glu, R' = H



Hosenkoside C
R = Glu(2→1)Glu

BIOLOGICAL ACTIVITY

2-Methoxy-1,4-naphthoquinone exhibited strong antifungal action against *Candida albicans, Aspergillus niger, Cryptococcus neoformans* and *Epidermophyton floccussum;* its activity against *E. floccussum* (MIC 5.0 μg/ml) was the same as that of nystatin. It was strongly active against Gram +ve bacteria, *Bacillus subtilis,* as well as Gram -ve bacteria, *Salmonella typhimurium* (*Saengyak Hakhoechi* 1992, *23,* 240; *Chem. Abstr.* 1993, *119,* 124978 v).

I. scabrida DC.

Isolation of a novel flavonoid glycoside - gossypetin-7-O-β-D-glucoside - and its characterisation (*Asian J. Chem.* 1992, *4,* 936; *Chem. Abstr.* 1994, *120,* 4637 g).
Distribution: Himalayas, from Kashmir to Bhutan, alt. 1000-3600 m.

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IMPERATA (Poaceae)

I. arundinacea Cyrill.; see *I. cylindrica* (L.) P. Beauv.

I. cylindrica (L.) P. Beauv. syn. *I. arundinacea* Cyrill. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 224).

A new sesquiterpenoid - cylindrene - isolated and its structure elucidated (*J. Nat. Prod.* 1994, *57,* 1183); two new biphenyl ethers - cylindols A & B - isolated and characterised (*J. Nat. Prod.* 1994, *57,* 1290).

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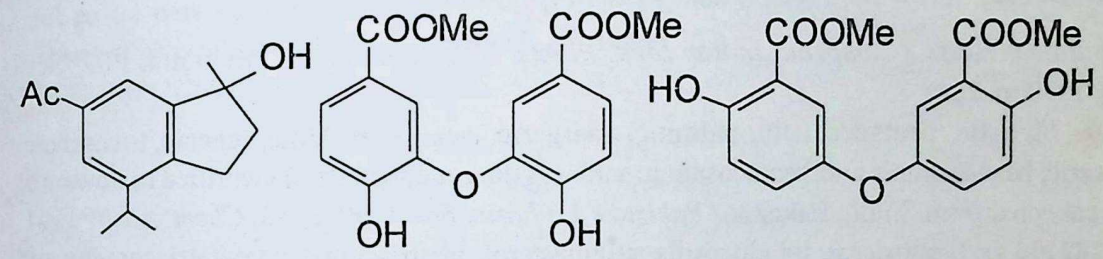

Cylindrene Cylindol A Cylindol B

BIOLOGICAL ACTIVITY

Cylindrene inhibited contraction of vascular smooth muscle of rabbit (*J. Nat. Prod.* 1994, *57,* 1183); cylindol A inhibited 5-lipoxygenase activity (*J. Nat. Prod.* 1994, *57,* 1290).

INDIGOFERA (Papilionaceae)

I. arrecta Hochst ex A.Rich.

Eng. - Natal indigo, Java indigo, Bengal indigo.

Kaempferitrin isolated from leaves (*Ghana J. Chem.* 1992, *1,* 293; *Chem. Abstr.* 1993, *119,* 113340 e).

Distribution: Native to Abyssinia, introduced into India, in Bihar, Uttar Pradesh and Assam.

I. enneaphylla L.; see *I. linnaei* Ali

I. hebepetala Benth. ex Baker

Isolation of morin, isorhamnetin, quercetin, and kaempferol and its 5-deoxy derivative from leaves (*Fitoterapia* 1993, *64,* 479); two new glycosides isolated and characterised as kaempferol-7-alloside and kaempferol-3,7-diarabinoside (*Phytochemistry* 1994, *35,* 275).

Distribution: Himalayas, from Kashmir to Sikkim, alt. 1800-4500 m.

I. linnaei Ali syn. *I. enneaphylla* L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 140).

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A new nitropropanoyl ester - 3,4,6-tri-O-(3-nitropropanoyl)-α-D-glucose - isolated along with 2,3,4,6-tetra-O-(3-nitropropanoyl)-α-D-glucose and karakin (1,2,6-tri-O-(3-nitropropanoyl)-β-D-glucose) (*Phytochemistry* 1992, *31*, 2393).

I. tinctoria L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 399).

Apigenin, kaempferol, luteolin and quercetin isolated from various parts of plant (roots, stems, leaves and pods) and tissue culture; production of flavonoids in tissue culture was greater than in plant parts (*Herba Pol.* 1990, *36*, 3; *Chem. Abstr.* 1991, *115*, 231915 m).

INULA (Asteraceae)

I. grantioides Boiss. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 224).

Myristic, pentadecanoic, palmitic, margaric, stearic, arachidic, behenic, tricosanoic, lignoceric, hexadecanoic and heptacosanoic acids (as their methyl esters) identified in flowers of plant collected from Sindh, Pakistan (*Pakistan J. Pharm. Sci.* 1990, *3*, 33; *Chem. Abstr.* 1991, *114*, 182106 s); β-sitosterol, its glucoside, stigmasterol, hentriacontane, pentatriacontene and pentatriacontane isolated from flowers (*Pakistan J. Pharm. Sci.* 1991, *4*, 131; *Chem. Abstr.* 1992, *116*, 170219 j); isolation of two new flavones - grantionin and grantioidinin - and their characterisation; in addition pulchidione also isolated (*Z. Naturforsch.* 1991, *46*B, 950; *Chem. Abstr.* 1991, *115*, 110674 y); another new flavonol - grantioidin - and its structure determination; lupeol, taraxasterol, its acetate, triacontanol and β-sitosterol also isolated (*Phytochemistry* 1991, *30*, 1040); taraxasterol, acetates of taraxasterol and lupeol and palmitates of lupeol and β-amyrin isolated from flowers (*Pakistan J. Sci. Ind. Res.* 1992, *35*, 352; *Chem. Abstr.* 1993, *119*, 45227 w); isolation of pectolinarigenin, salvigenin, α-tocopherylquinone and sitosteryl-β-D-glucoside from aerial parts (*Fitoterapia* 1993, *64*, 381).

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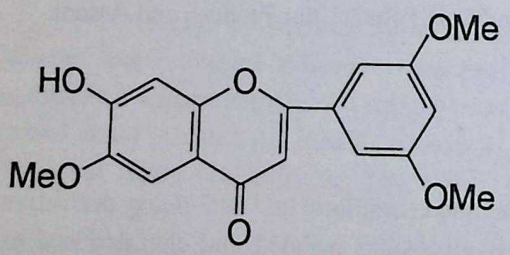
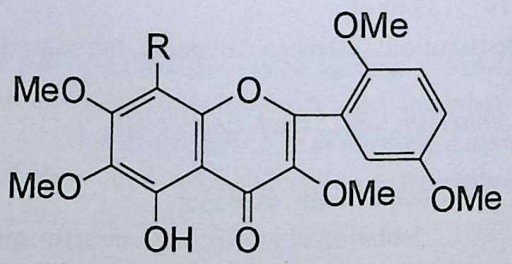


Grantionin



Grantioidin
R = H
Grantioidinin
R = OMe

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I. graveolens Desf. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 400).

A new eudesmanolide - 3α-hydroxyeudesm-4-en-12,6β-olide - isolated from aerial parts and characterised; in addition, 4α,5α-epoxyinuviscolide, tomentosin, 4H-tomentosin, carabrone, 4H-carabrone, costic acid, 2α-, 3α-, 1β-hydroxycostic acids, isocostic acid, illicic acid, sakuranetin, aromadendrin, its 7-O-methyl-, 3-O-acetyl-7-O-methyl- and 3-epi derivatives, 3-O-acetyltaxifolin, padmatin and its 3-epi derivatives,scutellarein 6-methyl ether, kaempferol, its 3-methyl ether, 6-hydroxykaempferol-3,6-dimethyl, ether, p-hydroxybenzoic acid and 2-(p-hydroxyphenyl)ethyl stearate also isolated (*Phytochemistry* 1992, *31,* 195); a new eudesmanolide - 11,13-dihydroivalin - along with ivalin, inuviscolide, 8-epiinuviscolide and 8-epixanthin-1β,5β-epoxide isolated from aerial parts; new compound characterised (*Phytochemistry* 1993, *33,* 407); stereoselective synthesis of graveolide (*J. Org. Chem.* 1993, *58,* 1030).

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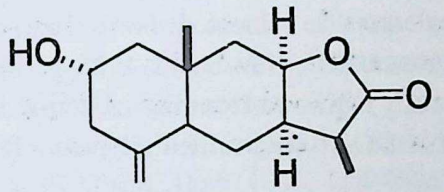

11,13-Dihydroivalin

BIOLOGICAL ACTIVITY

Inuviscolide exhibited antibacterial activity against *Staphylococcus epidermidis* with MIC 100.0 μg/ml. Ivalin showed appreciable cytotoxicity against cultured P-388 (murine), KB-3 (nasopharyngeal carcinoma) and KB-VI (vinblastine-resistant) cells with ED50 0.14, 1.8 and 1.3 μg/ml respectively (*Phytochemistry* 1993, *33,* 407).

I. helenium L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 400).

Oil was bacteriostatic and fungistatic (*J. Essent. Oil Res.* 1993, *5,* 411; *Chem. Abstr.* 1994, *121,* 42522 u); it exhibited appreciable antibacterial activity against *Staphylococcus aureus* and *S. pyrogenes* (*Fitoterapia* 1994, *65,* 279).

Alantolactone (52.4) and isoalantolactone (33.0%) determined in oil (*J. Essent. Oil Res.* 1993, *5,* 411; *Chem. Abstr.* 1994, *121,* 42522 u).

I. indica L.; see *Pentanema indicum* (L.) Ling

I. racemosa Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 400).

Three new oxygenated alantolides - I, II and 4(15)-α-epoxyisotelekin - isolated and their stereostructures determined (*Phytochemistry* 1990, *29,* 2341).

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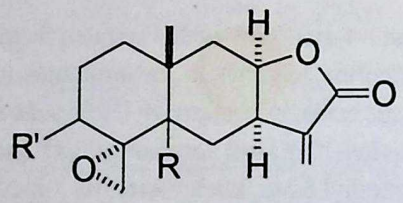

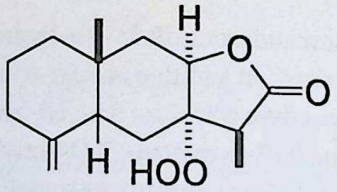

I

R = α-OH, R' = H

4(15)-α-Epoxyisotelekin

R = H, R' = α-OH

II

IPOMOEA (Convolvulaceae)

I. alba L. syn. *Calonyction aculeatum* (L.) House, *Ipomoea bona-nox* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 401).

Calonyctin A, previously extracted from leaves, found to consist of two components - DC-2b and DC-2d; structure of DC-2b determined (*Bopuxue Zazhi* 1992, *9,* 9; *Chem. Abstr.* 1992, *117,* 192185 t).

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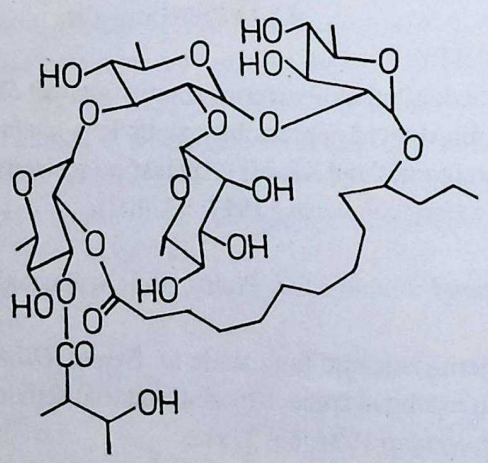

DC-2b

I. aquatica Forssk. syn. *I. reptans* (L.) Poir. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 141).

β-Carotene, lutein, its epoxide,violaxanthin and neoxanthin identified as major carotenoids by HPLC (*J. Chromatogr.* 1991, *543,* 147); cis-lutein and cis-β-carotene identified by HPLC (*Food Chem.* 1992, *45,* 129; *Chem. Abstr.* 1992, *117,* 110282 k); phytol (37.08), palmitic acid (10.99), (Z)3-hexen-1-ol (5.7), α-humulene (2.28), n-hexacosane (2.25) and bis(2-ethylhexyl)sebecate (2.17%) determined in essential oil by GC-MS (*J. Essent. Oil. Res.* 1992, *4,* 219; *Chem. Abstr.* 1993, *118,* 190364 x).

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I. batatas (L.) Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 402).

Hot water extract of plant was potent inhibitor of lens aldose-reductase activity (*Chem. Pharm. Bull.* 1991, *39,* 3346); polysaccharide from leaves increased platelet count in an animal model, presumably due to elevated production of thrombopoietin (*Beijing Yike Daxue Xuebao* 1993, *25,* 261; *Chem. Abstr.* 1994, *120,* 315498 u).

Ellagic acid and 3,5-dicaffeoylquinic acid isolated (*Chem. Pharm. Bull.* 1991, *39,* 3346); isolation of a new triterpene - boehmeryl acetate - from roots and its structure determination (*J. Agric. Food Chem.* 1990, *38,* 134; *Chem. Abstr.* 1990, *112,* 52202 t); fumaric and succinic acids identified in stem (*Zhongguo Zhongyao Zazhi* 1991, *16,* 551; *Chem. Abstr.* 1992, *116,* 55572 g); 3-diglucosido-5-glucosides of cyanidin, peonidin, p-hydroxybenzoylcyanidin, p-hydroxybenzoylpeonidin, caffeoyl-p-hydroxybenzoylcyanidin, caffeoyl-p-hydroxybenzoyl-peonidin and caffeoylpeonidin identified in periderm (*Engei Gakkai Zasshi* 1991, *60,* 217; *Chem. Abstr.* 1991, *115,* 252066 a); two anthocyanin pigments isolated from roots and identified as peonidin-3-diglucosido-5-glucoside with 3 molecules of ferulic acid and 1 molecule of caffeic acid and peonidin-3-diglucosido-5-glucoside with 2 molecules of ferulic acid and 1 molecules of caffeic acid (*J. Food Sci.* 1992, *57,* 755; *Chem. Abstr.* 1992, *117,* 89097 s); hexadecanoic acid (47.62%), 9,12,15-octadecatrienoic acid and 12,15-decadienoic acid isolated from leaves (*Tianran Chanwu Yanjiu Yu Kaifa* 1992, *4,* 39; *Chem. Abstr.* 1993, *118,* 98047 y); quercetin, its 3-glucoside and 4,7,3'-trimethylether, kaempferol-7,4'-dimethylether, ombuin, β-sitosterol and sucrose isolated from leaves (*Zhongcaoyao* 1994, *25,* 179; *Chem. Abstr.* 1994, *121,* 153299 w).

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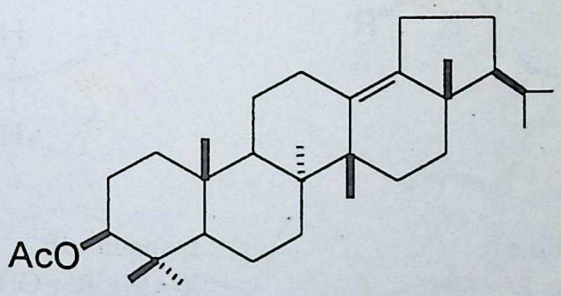

Boehmeryl acetate

BIOLOGICAL ACTIVITY

Boehmeryl acetate stimulated oviposition in sweet potato weevil, *Cycas formicarius elegantulus* (*J. Agric. Food Chem.* 1990, *38,* 134; *Chem. Abstr.* 1990, *112,* 52202 t).

I. biloba Hook.f.; see *I. pes-caprae* (L.) R.Br. ssp. *pes-caprae*

I. bona-nox L.; see *I. alba* L.

I. carnea Jacq.; see *I. carnea* Jacq. ssp. *fistulosa* (Mart. ex Choisy) D. Austin

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I. carnea Jacq. ssp. *fistulosa* (Mart. ex Choisy) D. Austin syn. *I. carnea* Jacq. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 364).

Three lignins, composed of guaicyl-, syringyl- and p-hydroxyphenylpropane building units, isolated (*Himalayan Chem. Pharm. Bull.* 1989, *6,* 45; *Chem. Abstr.* 1990, *112,* 52307 f).

I. coccinea L.; see *I. hederifolia* L.

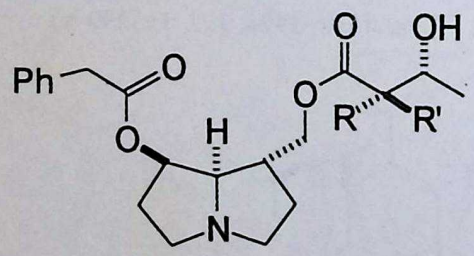
I. grandiflora Lamk.; see *I. violacea* L.

I. hederacea (L.) Jacq.; see *I. nil* (L.) Roth

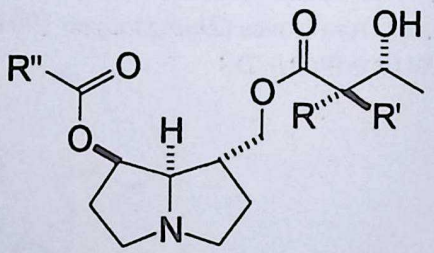
I. hederifolia L. syn. *Quamoclit coccinea* Moench, *Ipomoea coccinea* Hook.f. (non L.) (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 208).

Linoleic (40.1), palmitic (22.2), oleic (13.5), stearic (11.3), vernolic (6.4), behenic (3.8) and arachidic (3.5%) acids determined in seeds (*J. Am. Oil Chem. Soc.* 1992, *69,* 190; *Chem. Abstr.* 1992, *116,* 148291 e); two pairs of isomeric turneforcidine diesters - ipanguline A/ isoipanguline A and ipanguline B/isoipanguline B - isolated from aerial parts and their structures determined (*Phytochemistry* 1993, *34,* 437).

NEW COMPOUNDS



Ipanguline A
R = Me, R' = OH
Isoipanguline A
R = OH, R' = Me



Ipanguline B
R = Me, R' = OH, R" = O-Hydroxy phenyl
Isoipangulin B
R = OH, R' = Me, R" = O-Hydroxy phenyl

I. nil (L.) Roth syn. *I. hederacea* auct. [non(L.) Jacq.], *Pharbitis nil* Choisy (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 226).

A peonidin glycoside (I) as major and peonidin-3-sophorosido-5-glucoside as minor pigment isolated from violet-blue flowers (*Phytochemistry* 1991, *30,* 2387); another new pigment - cyanidin-8-sophorosido-5-glucoside - from violet-blue flowers and its characterisation (*Phytochemistry* 1993, *33,* 245).

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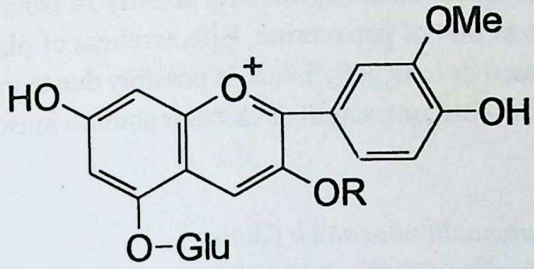

I

R = Glu[(2→1)Glu[6-(4-glucosidocaffeoyl)]

I. pes-caprae (L.) R.Br. ssp. *pes-caprae* syn. *I. biloba* sensu Hook.f., p.p. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 364).

Five fatty acid glycosides - pescaprosides A, B, C, D and E - present in plant extract, of which pescaprosides A, B and E isolated. Pescaproside E characterised as O-α-L-rhamnopyranosyl(1→3)-O-[α-L-rhamnopyranosyl(1→4)]-O-α-L-rhamnopyranosyl(1→4)-O-β-D-fucopyranosyl(1→2)-O-α-L-rhamnopyranosyl-11-oxyhexadecanoic acid having its nonanomeric hydroxyl groups esterified with methylbutyric acid and lauric acid (*Carbohydr. Res.* 1991, *212,* 169; *Chem. Abstr.* 1992, *116,* 37924 u); isolation of 2-hydroxy-4,4,7-trimethyl-1(4H)naphthalenone, (–)mellein, eugenol and 4-vinylguaiacol (*Planta Med.* 1991, *57,* 515); β-damascenone and E-phytol isolated as active compounds from leaves (*Planta Med.* 1992, *58,* 19).

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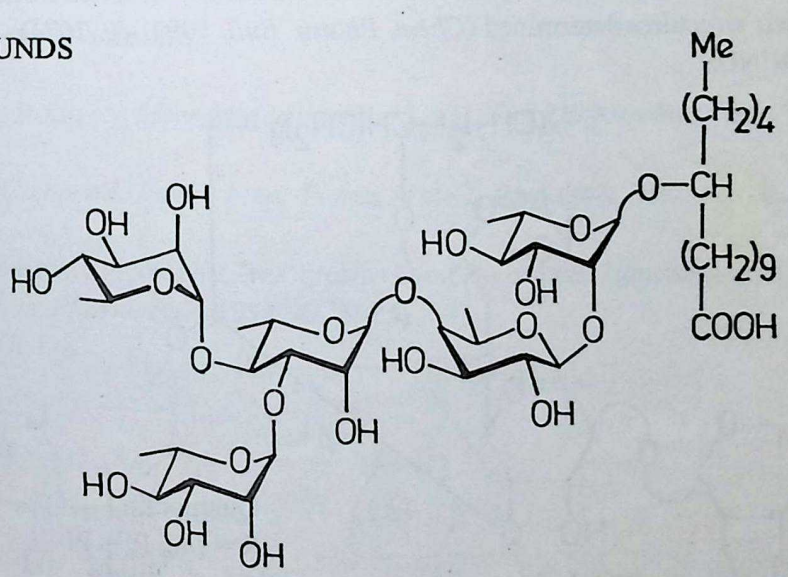

Pescaproside E

BIOLOGICAL ACTIVITY

2-Hydroxy-4,4,7-trimethyl-1(4H)-naphthalenone, (–)mellein, eugenol and 4-vinylguaiacol inhibited prostaglandin synthesis *in vitro*; eugenol and 4-vinylguaiacol were most active, with IC50 9.2 and 18.0 μM respectively. Inhibitory effect on prostaglandin formation

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may partly explain anti-inflammatory activity of plant extract (*Planta Med.* 1991, *57*, 515); β-damascenone and E-phytol exhibited antispasmodic activity in isolated guinea pig ileum with potency in the same range as that of papaverine. Effectiveness of plant extract in treatment of dermatitis, such as that caused by toxic jellyfishes, is possibly due to presence of β-damascenone and E-phytol which interfere with contraction of vascular smooth muscle cell (*Planta Med.* 1992, *58*, 19).

I. phoenicea Roxb. syn. *Quamoclit phoenicea* Choisy

Palmitic (33.3), linoleic (30.8), oleic (14.6), vernolic (10.2), arachidic (6.8), behenic (2.6) and stearic (1.7%) acids determined in seed oil (*J. Am. Oil Chemists Soc.* 1992, *69*, 190; *Chem. Abstr.* 1992, *116*, 148291 e).

Distribution: Introduced into Indian gardens.

I. purpurea (L.) Roth syn. *Pharbitis purpurea* (L.) Voigt (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 403).

Isolation of a new glycoside from flowers and its characterisation as hispidulin-7-O-neohesperidoside (*Indian J. Chem.* 1994, *33*B, 507).

I. quamoclit L. syn. *Quamoclit pinnata* (Desr.) Bojer (*pennata*) (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 365).

Four new resin glycosides - quamoclins I, II, III and IV - isolated from jalapin fraction of seeds and their structures determined (*Chem. Pharm. Bull.* 1992, *40*, 2674).

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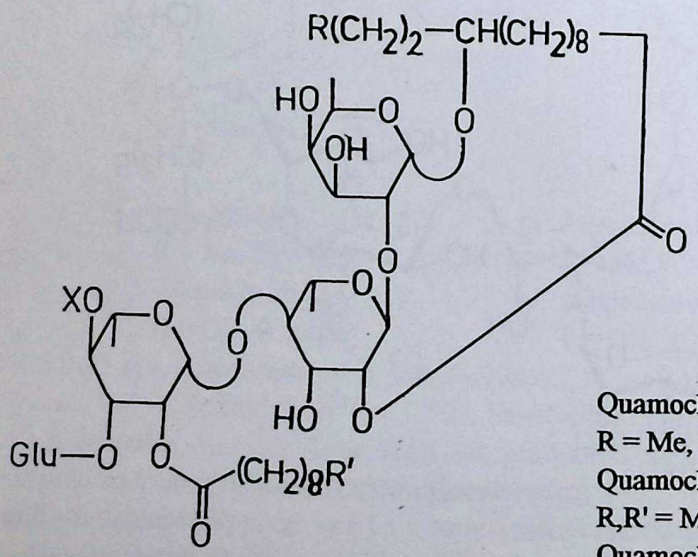

X=Rha[4-O-(2-MeButyryl]

Quamoclin I
R = Me, R' = Pr
Quamoclin III
R,R' = Me
Quamoclin IV
R,R' = Pr

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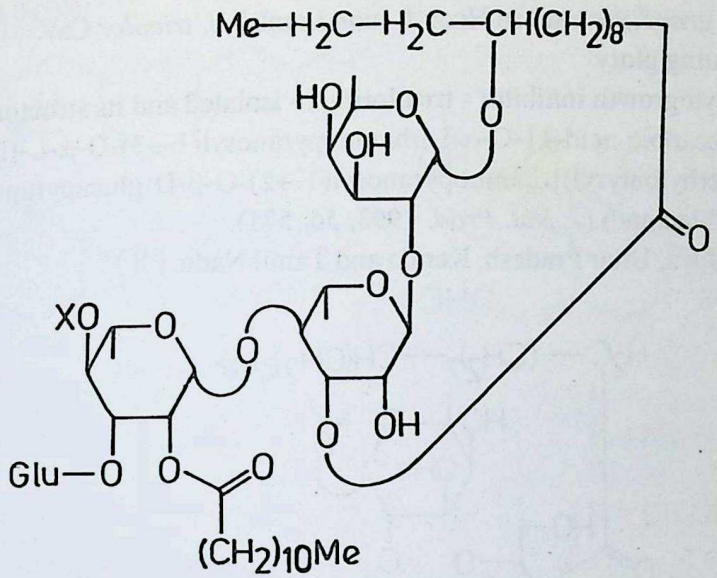


X=Rha[4-O-(2-Me Butyryl)]
Quamoclin II

I. reptans (L.) Poir. see *I. aquatica* Forssk.

I. sinuata Ortega; see *Merremia dissecta* (Jacq.) Hallier f.

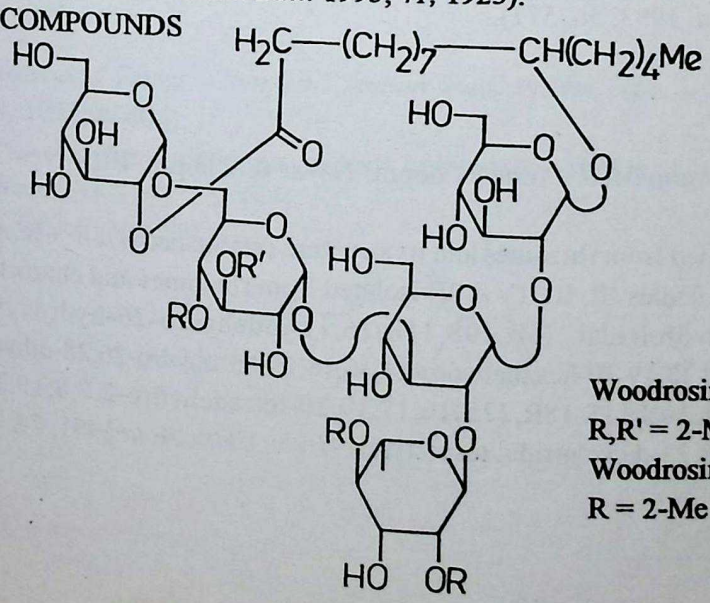
I. tricolor Cav.; see *I. violacea* L.

I. tridentata (L.) Roth; see *Merremia tridentata* (L.) Hallier f. ssp. *tridentata*

I. tuberosa L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 227).

Two new resin glycosides - woodrosins I and II - isolated from stems and their structures determined (*Chem. Pharm. Bull.* 1993, *41,* 1925).

NEW COMPOUNDS



Woodrosin I
R,R' = 2-Me Butyryl
Woodrosin II
R = 2-Me Butyryl, R' = Isobutyryl

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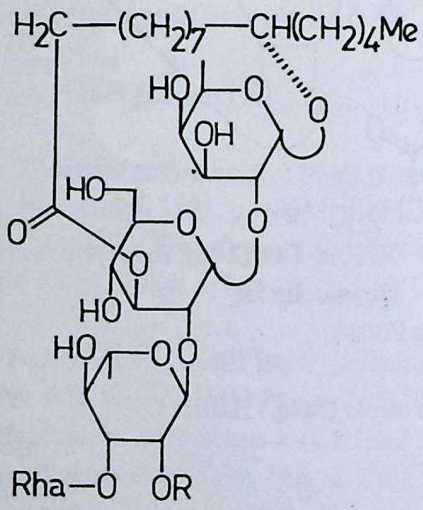
I. violacea L. syn. *I. grandiflora* sensu Hook.f. (non Lamk.), *I. tricolor* Cav.

Eng. - Morning glory.

A major phytogrowth inhibitor - tricolorin A - isolated and its structure determined as 11(S)hydroxyhexadecanoic acid-11-O-α-L-rhamnopyranosyl(1→3)-O-α-L-[2-O-(2S-methylbutyryl)-4-O-(2S-methylbutyryl)]rhamnopyranosyl(1→2)-O-β-D-glucopyranosyl(1→2)-β-D-fucopyranoside (1,3"-lactone) (*J. Nat. Prod.* 1993, *56*, 571).

Distribution: Meghalaya, Uttar Pradesh, Kerala and Tamil Nadu.

NEW COMPOUNDS



Tricolorin A
R = 2-Me Butyryl

BIOLOGICAL ACTIVITY

Tricolorin A inhibited plant growth and also showed antibacterial activity against *Staphylococcus aureus* with MIC 1.8 μg/ml. It was cytotoxic to cultured P-388 and human breast cancer cells (ED50 2.2 μg/ml). It also inhibited phorbol-12,13-dibutyrate binding using calf brain homogenate (*J. Nat. Prod.* 1993, *56*, 571).

IRIS (Iridaceae)

I. foetidissima L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 143).

A novel iridal (I) isolated from rhizomes and its structure established (*Helv. Chim. Acta* 1990, *73*, 433); four more new iridals (II, III, IV & V) isolated from rhizomes and characterised as (6R,10S,11S)16,17-didehydroiridal, (6R,10S,11S)16,17-didehydro-26-hydroxyiridal, (6R,10S,11S,14S,26R)15,16,17,18,19,20-hexadehydro-14,15,18,19-tetrahydro-26,28-dihydroxy-26,14-cycloiridal and (6S,7R,10S,11S,18R,22S)16,17,19,20-tetradehydro-2,7,8,19,22,23-hexahydro-22-methyl-3-O,7:18,23-dicycloiridal respectively (*Helv. Chim. Acta* 1991, *74*, 2035).

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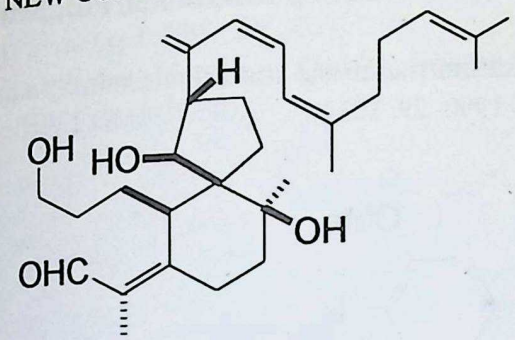
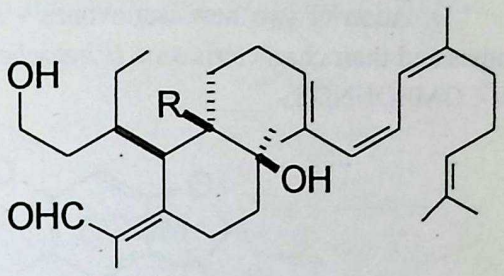
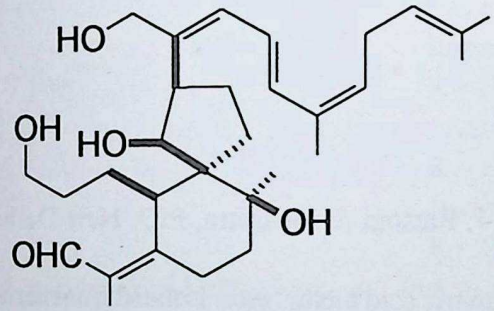
NEW COMPOUNDS



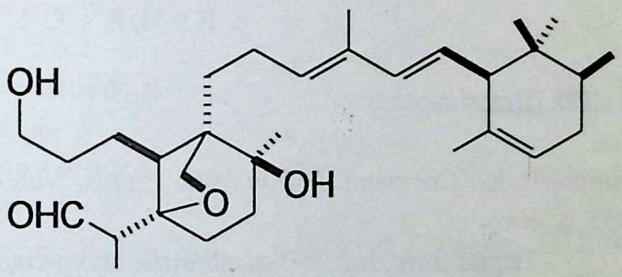
I



II
R = Me
III
R = CH_2OH



IV



V

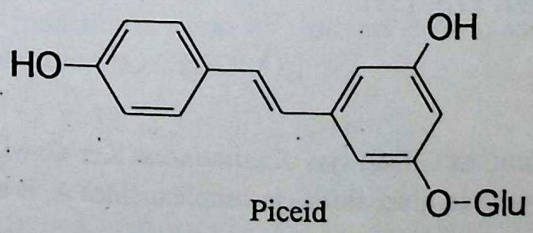
I. germanica L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 365).

Confirmation of structures of 5,3',4',5'-tetramethoxy-6,7-methylenedioxyisoflavone and 5,3',4'-trimethoxy-6,7-methylenedioxyisoflavone by synthesis (*J. Indian Chem. Soc.* 1990, *67*, 144); synthesis of 5,7,3'-trihydroxy-6,4'-dimethoxyisoflavone (*J. Indian Chem. Soc.* 1990, *68*, 615).

I. hookeriana Foster (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 406).

A stilbene glycoside - piceid - isolated from rhizomes and its structure elucidated (*Indian J. Pharm. Sci.* 1993, *55*, 197).

NEW COMPOUNDS



Piceid

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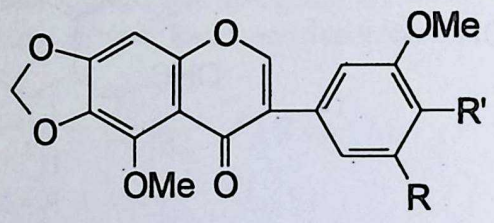
I. kashmiriana Baker (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 394).

Isolation of two new isoflavones - isoiriskashmirianin and iriskashmirianin - from rhizomes and their characterisation (*Phytochemistry* 1990, *29,* 1014).

NEW COMPOUNDS



Isoiriskashmirianin
R = OH, R' = H
Iriskashmirianin
R = H, R' = OH

ISATIS (Brassicaceae)

I. tinctoria L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 406).

Triptanthrin, indole-3-acetonitrile and p-coumaric acid methyl ester isolated from aerial parts (*Z. Naturforsch.* 1994, *49*C, 6; *Chem. Abstr.* 1994, *120,* 187241 r).

BIOLOGICAL ACTIVITY

Tryptanthrin, indole-3-acetonitrile and p-coumaric acid methyl ester exhibited antifeedant activity against termite, *Reticulitermis santonensis,* insecticidal activity against larvae of the house longhorn beetle *Hylotrupes bajulus* and fungicidal activity against brown-rot fungus *Cohiphora puteana* (*Z. Naturforsch.* 1994, *49*C, 6; *Chem. Abstr.* 1994, *120,* 187241 r).

JACQUINIA (Theophrastaceae)

J. ruscifolia Jacq. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 395).

Protoprimulagenin A, primulagenin A, aegicerin and ursolic acid isolated from stem bark (*Indian J. Chem.* 1992, *31*B, 133).

JASMINUM (Oleaceae)

J. amplexicaule Buch.-Ham. ex G.Don syn. *J. undulatum* Ker-Gawl.

Three new seco-iridoid glucosides - jasamplexosides A, B and C - isolated from leaves

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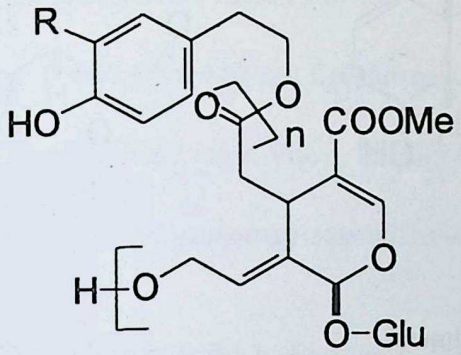
and stems together with 10-hydroxyligustroside and jasminoside; new compounds characterised (*Planta Med.* 1992, *58,* 552).

Distribution: Himalayas, Sikkim , Bhutan, Assam and Meghalaya, ascending to 1500 m.

NEW COMPOUNDS



Jasamplexoside A
R = H, n = 2
Jasamplexoside B
R = H, n = 3
Jasamplexoside C
R = OH, n = 2

J. auriculatum Vahl (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 407).

A regio- and stereoselective synthesis of cis-jasmone (*Zh. Org. Khim.* 1990, *26,* 1678; *Chem. Abstr.* 1991, *114,* 42374 c); synthesis of dihydrojasmone (*Gazz. Chim. Ital.* 1991, *121,* 233; *Chem. Abstr.* 1991, *115,* 159460 q).

J. multiflorum (Burm.f.) Andrews syn. *J. pubescens* (Retz.) Willd. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 408).

Isolation of four new seco-iridoid lactones - jasmolactones A, B, C and D - from aerial parts and their structure elucidation (*J. Nat. Prod.* 1989, *52,* 1060); three new seco-iridoid glycosides - multifloroside, multiroside and 10-hydroxyoleoside-11-methyl ester - isolated and characterised; in addition, 10-hydroxyoleuropein and 10-hydroxyligustroside isolated (*Phytochemistry* 1990, *29,* 2905); isolation and structure determination of one more new seco-iridoid glucoside - jasmultiside - from aerial parts (*J. Nat. Prod.* 1991, *54,* 1087); isolation of new seco-iridoid lactone - multiflorin - and its structure determination (*J. Chin. Chem. Soc.* 1994, *41,* 473; *Chem. Abstr.* 1994, *121,* 175205 q).

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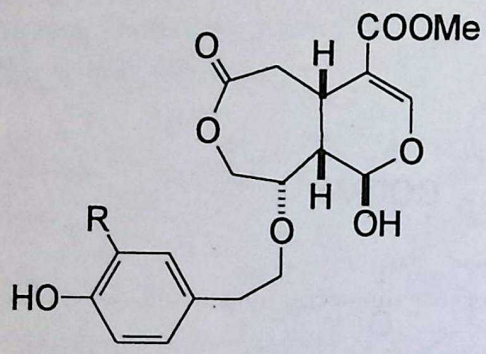
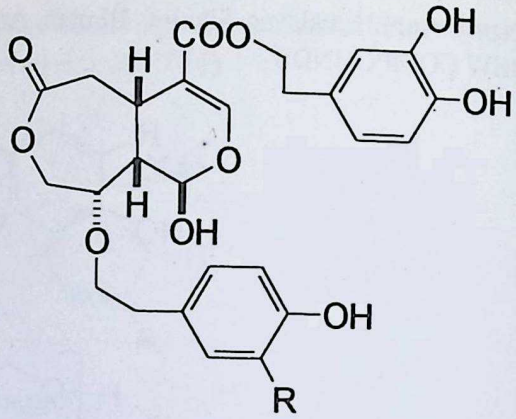
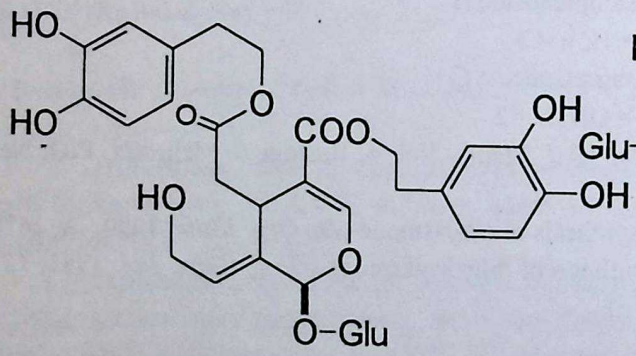


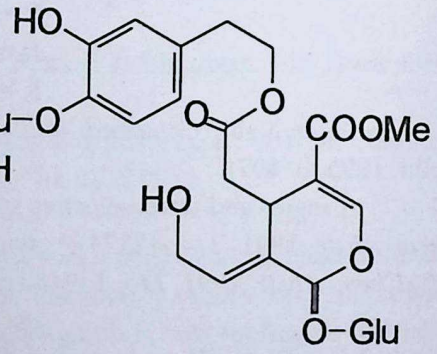
Jasmolactone A
R = H
Jasmolactone B
R = OH



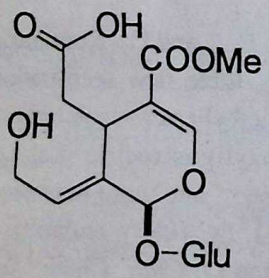
Jasmolactone C
R = H
Jasmolactone D
R = OH



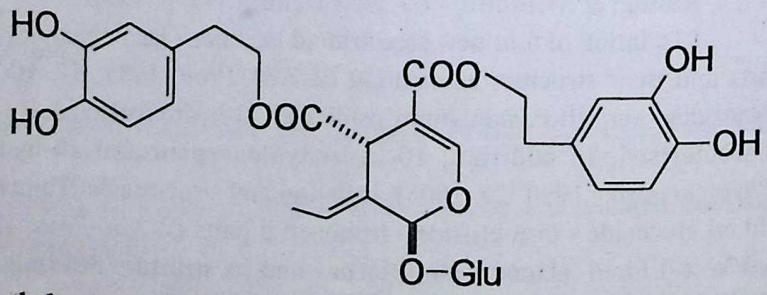
Multifloroside



Multiroside



10-Hydroxyoleoside-11-methyl ester



Jasmultiside

BIOLOGICAL ACTIVITY

Jasmolactones B and C exhibited coronary vasodilating and cardiotropic activities (*J. Nat. Prod.* 1989, *52*, 1060); 10-hydroxyoleuropein and multifloroside also exhibited coronary dilating and cardiotropic effects (*Phytochemistry* 1990, *29*, 2905).

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J. nudiflorum Lindl.

Eng. - Jasmine.

Verbascoside, poliumoside, forsythoside B and echinacoside isolated (*Phytochemistry* 1992, *31,* 885).

Distribution: Native of China, introduced into Indian gardens.

J. pubescens (Retz.) Willd.; see *J. multiflorum* (Burm.f.) Andrews

J. sambac (L.) Ait. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 408).

Linalyl-β-D-glucoside and its 6'-O-malonate isolated from flower buds (*Phytochemistry* 1994, *36,* 1435).

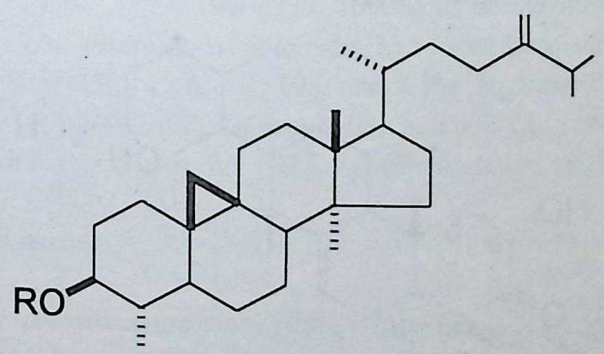
J. undulatum Ker-Gawl.; see *J. amplexicaule* Buch.-Ham. ex G.Don

JATROPHA (Euphorbiaceae)

J. curcas L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 410).

Four globulins and seven albumins isolated (*Orient. J. Chem.* 1990, *6,* 275; *Chem. Abstr.* 1991, *114,* 192357 p); a proteolytic enzyme - curcain - isolated from latex (*J. Pharm. Pharmacol.* 1991, *43,* 111); a new tetracyclic triterpene ester - jatrocurin - isolated from stems and characterised; scopoletin methyl ether, friedelin and epifriedelinol also isolated (*J. Indian Chem. Soc.* 1993, *70,* 543).

NEW COMPOUNDS



Jatrocurin
R = Feruloyl

BIOLOGICAL ACTIVITY

Protein factor III was toxic with LD50 150 μg/100 g. It increased prothrombin, bleeding and coagulation time (*Orient. J. Chem.* 1990, *6,* 275; *Chem. Abstr.* 1991, *114,* 192357 p).

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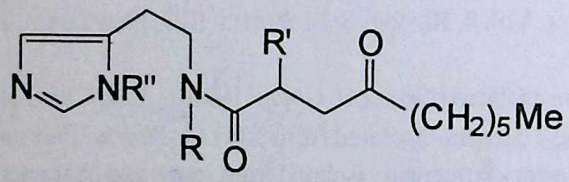
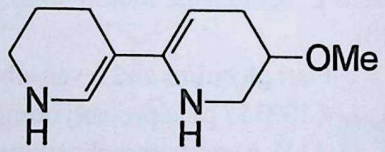
J. gossypifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 411).

Determination of alanine (28.1), glycine (19.71), valine (18.9), methionine (13.07), leucine (12.30), isoleucine (3.92), cystine (2.94) and arginine (0.98%) in seed essential oil (*J. Inst. Chemists,* Calcutta, 1989, *61,* 27; *Chem. Abstr.* 1990, *112,* 4554 n); jatropholone A and jatrophatrione isolated from roots (*Pertanika* 1990, *13,* 405; *Chem. Abstr.* 1991, *115,* 203330 y); leaves afforded two new triterpenes - a trihydroxyketone (I) and the corresponding diosphenol (II) (*J. Nat. Prod.* 1992, *55,* 807); four alkaloids isolated from exudate, of which structures of alkaloids A, B and C elucidated (*Indian J. Chem.* 1992, *31*B, 67); seed oil (35.8%) contained arachidic, behenic, caprylic, lignoceric, linoleic, myristic, oleic, palmitic, palmitoleic, stearic and vernolic acids as determined by GC-MS (*Plant Food Hum. Nutr.* 1993, *43,* 197; *Chem. Abstr.* 1993, *119,* 71071 k); β-amyrin, β-sitosterol, threonine, proline, glycine, alanine, valine, isoleucine, leucine, arginine, glutamic acid, xylose, arabinose, rhamnose and myristic, palmitic, stearic, aspartic, oleic and linoleic acids isolated from seeds (*Fitoterapia* 1993, *64,* 376); synthesis of jatrophan and 2,3-bis(hydroxymethyl)-6,7-methylenedioxy-1(3',4'-dimethoxyphenyl) naphthalene (*Indian J. Chem.* 1993, *32*B, 709).

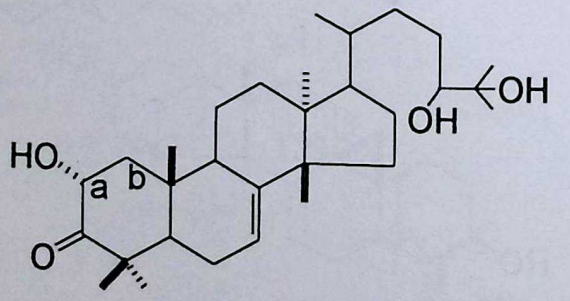
NEW COMPOUNDS



Alkaloid A
R,R" = H, R' = OH
Alkaloid B
R = Me, R' = H, R" = Ac



Alkaloid C



I
II
ab = Δ

J. multifida L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 145).

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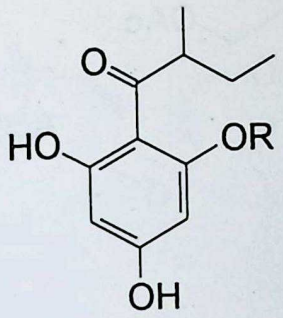
Two new acylphloroglucinols - multifidol and its 1-O-glucoside - isolated from latex and characterised (*Phytochemistry* 1989, *28*, 2439).

NEW COMPOUNDS



Multifidol
R = H
Multifidol-1-O-glucoside
R = Glu

JUGLANS (Juglandaceae)

J. regia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 412).

Juglone content in bark, shoots and seedlings measured every 10 days for whole year; it was found lowest in shoots and seedlings during dormant period in winter and highest in july (*Ege Univ. Ziraat Fak. Derg.* 1988, *25,* 215; *Chem. Abstr.* 1990, *113,* 112528 m); caffeic, chlorogenic, p-coumaric, ferulic, gallic, gentisic, p-hydroxybenzoic, p-hydroxy phenylacetic, protocatechuic, sinapic, salicylic, vanillic and syringic acids detected by GC in leaves (*Acta Pol. Pharm.* 1989, *46,* 494; *Chem. Abstr.* 1990, *113,* 169006 u); leaves contained primary alcohols (41.6), hydrocarbons (3.0), esters (3.5), aldehydes (5.5) and fatty acids (8.4%); in fruits the corresponding values were 35.7, 15.6, 3.4, 10.0 and 4.7%. Juglone identified in both parts of plant (*Phytochemistry* 1990, *29,* 2097); chlorophylls a and b, β-carotene and juglone detected in lipophilic substances of leaves (*Farm. Zh.* 1991, 77; *Chem. Abstr.* 1991, *114,* 225700 a).

JUNIPERUS (Cupressaceae)

J. indica Bertol. syn. *J. pseudosabina* sensu Hook.f. (non Fisch. & Mey.), *J. wallichiana* Hook.f. & Thoms. ex Brandis (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 412).

Three new labdane diterpenes (I, II and III) isolated from leaves and twigs and their stereostructures determined (*Indian J. Chem.* 1990, *29*B, 911).

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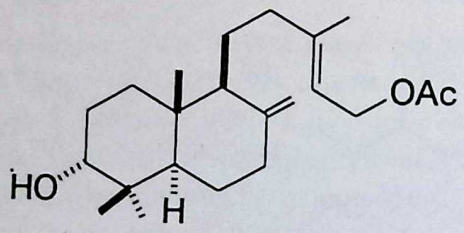
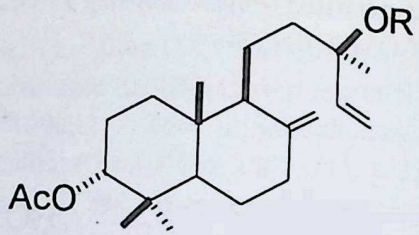
NEW COMPOUNDS



I



II
R = H
III
R = Ac

J. macropoda Boiss.; see *J. polycarpos* C.Koch

J. polycarpos C.Koch syn. *J. macropoda* auct. (non Boiss.) (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 370).

Camphene, camphor, car-3-ene, carvone, citronellol, citronellyl acetate, p-cymol, decanal, geraniol, geranyl acetate, linalool, limonene, myrcene, trans-β-ocimene, α-phellandrene, α-pinene, β-pinene, sabinene, sabinyl acetate, γ-terpinene, α-terpinene, terpinen-4-ol, α-terpineol, terpinolene and tricyclene detected in leaf oil (*Subtrop. Kul't.* 1989, 131; *Chem. Abstr.* 1990, *112*, 213884 j).

J. pseudosabina Fisch. & Mey.; see *J. indica* Bertol.

J. wallichiana Hook.f. & Thoms. ex Brandis; see *J. indica* Bertol.

JUSSIAEA (Onagraceae)

J. repens L.; see *Ludwigia adscendens* (L.) Hara

J. speciosa Ridley; see *Ludwigia peruviana* (L.) Hara

JUSTICIA (Acanthaceae)

J. glauca Rottl.

A new lignan - jusglaucinol - isolated from aerial parts and its structure established as (+)5-methoxylariciresinol; in addition, (+)isolariciresinol, (+)8-methoxyisolariciresinol, (+)lariciresinol, (+)5,5'-dimethoxylariciresinol, (+)medioresinol and (+)syringaresinol isolated (*Indian J. Chem.* 1991, *30*B, 681); a furanoid lignan - justiciresinol - isolated and characterised; (+)pinoresinol, (+)medioresinol, (+)lariciresinol, (+)isolariciresinol and (+)8-methoxy-isolariciresinol also isolated (*J. Nat. Prod.* 1991, *54*, 1639).

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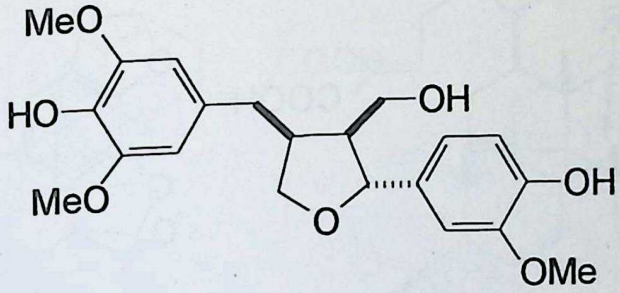
Distribution: Peninsular India.

NEW COMPOUNDS



Jusglaucinol

Note: Trivial names, jusglaucinol and justiciresinol, are given to the same compound.

J. tranquebariensis L.f.

Tam. - Sivanarvembu.

(+)Lariciresinol, (+)isolariciresinol, (+)8-methoxyisolariciresinol, (+)lyoniresinol, (+)medioresinol, β-sitosterol glucoside, brassicasterol, campesterol, stigmasterol, sitosterol, spinasterol, 7,22-ergostadienol and 28-isofucosterol isolated from aerial parts (*Indian J. Chem.* 1989, *28*B, 558).

Distribution: Peninsular India, Karnataka southwards.

KADSURA (Schisandraceae)

K. heteroclita (Roxb.) Craib syn. *K. roxburghiana* Arn., *K. wightiana* Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 414).

Four new triterpenoid acids - 12α-hydroxy-, 12β-hydroxy-, 12α-acetoxy- and 12β-acetoxy-coccinic acids - isolated and characterised (*Planta Med.* 1989, *55,* 548); isolation of two seco-triterpene acids - seco-neokadsuranic acid A and 3,4-seco-(24Z)-lanosta-4(30),8,24-trien-3,26-dioic acid (I) - and their characerisation (*Planta Med.* 1989, *55,* 300); a new triterpenoid - kadsulactone A - from stems and its structure elucidation (*Phytochemistry* 1990, *29,* 3358); roots afforded a new triterpenoid - isoanwuweizic acid - whose structure established by ^{13}C-NMR and 2D-cosy NMR spectrometry (*Gaodeng Xuexiao Huaxue Xuebao* 1990, *11,* 423; *Chem. Abstr.* 1990, *113,* 148920 x); gomisin A, gomisin B, schizandrin, angeloylgomisin P, angeloylgomisin H, tigloylgomisin P and R(+)gomisin M_1 isolated; conformation of tigloylgomisin P established (*J. Chin. Pharm. Sci.* 1992, *1,* 20; *Chem. Abstr.* 1993, *118,* 139477 j); two new lignans - heteroclitins F and G - isolated and their structures elucidated by X-ray analysis (*Chem. Pharm. Bull.* 1992, *40,* 1510).

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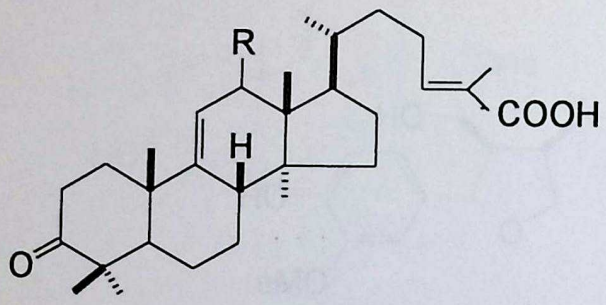
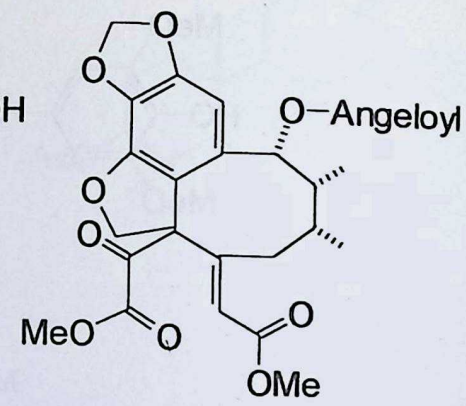
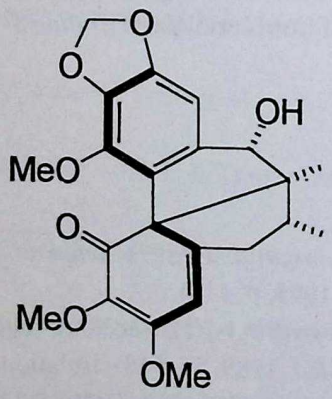
NEW COMPOUNDS



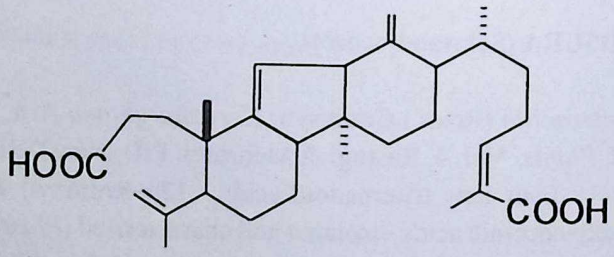
12α-Hydroxycoccinic acid
R = α-OH
12β-Hydroxycoccinic acid
R = β-OH
12α-Acetoxycoccinic acid
R = α-OAc
12β-Acetoxycoccinic acid
R = β-OAc



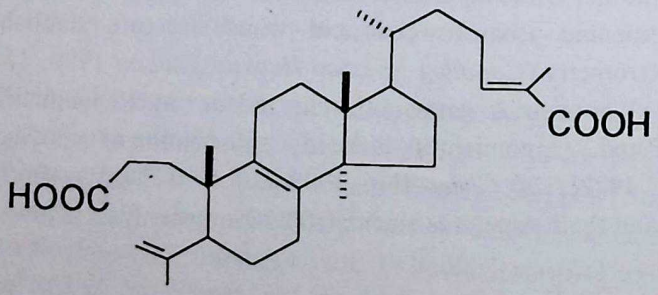
Heteroclitin F



Heteroclitin G



Seco-neokadsuranic acid A



I

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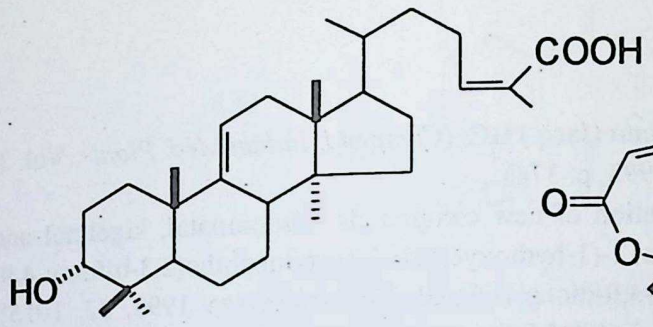
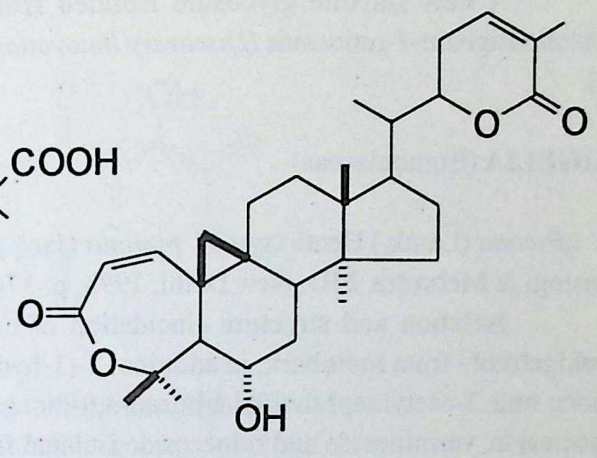


Isoanwuweizic acid



Kadsulactone A

BIOLOGICAL ACTIVITY

Tigloylgomisin B, angeloylgomisin P, R(+)gomisin M_1 exhibited PAF receptor antagonistic activity to human platelet (*J. Chin. Pharm. Sci.* 1992, *1,* 20; *Chem. Abstr.* 1993, *118,* 139477 j); dibenzocyclooctadiene-type lignans and related compounds from stems markedly inhibited lipid peroxidation in rat liver homogenate stimulated by Fe^{2+}-ascorbic acid, CCl_4-reduced form of NADP (NADPH) and ADP-NADPH (*Chem. Pharm. Bull.* 1992, *40,* 1510).

K. roxburghiana Arn.; see *K. heteroclita* (Roxb.) Craib

K. wightiana Arn.; see *K. heteroclita* (Roxb.) Craib

KAEMPFERIA (Zingiberaceae)

K. galanga L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 414).

Structure of kaempferia camphor, isolated from essential oil of plant, was shown to be ethyl p-methoxy-trans-cinnamate (*Fenxi Ceshi Xuebao* 1993, *12,* 45; *Chem. Abstr.* 1994, *120,* 240123 g).

KALANCHOE (Crassulaceae)

K. pinnata Pers.; see *Bryophyllum pinnatum* (Lam.) Oken

KICKXIA (Scrophulariaceae)

K. ramosissima (Wall.) Janchen syn. *Linaria ramosissima* Wall. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 418).

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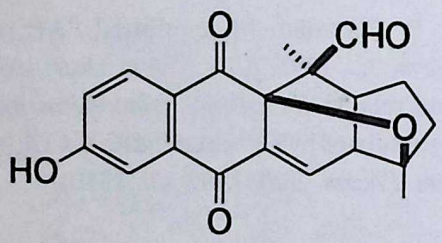
A new flavone glycoside isolated from leaves and characterised as acetylated pectolinarigenin-7-rutinoside (*Discovery Innovation* 1991, *3*, 59; *Chem. Abstr.* 1992, *116*, 102646 w).

KIGELIA (Bignoniaceae)

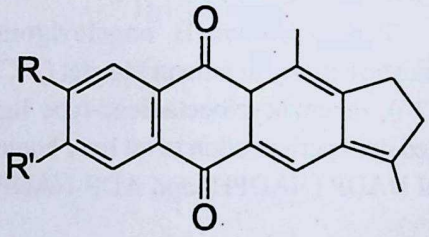
K. africana (Lamk.) Benth. syn. *K. pinnata* (Jacq.) DC. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 374).

Isolation and structure elucidation of new compounds - isopinnatal, kigelinol and isokigelinol - from roots bark; in addition, 2-(1-hydroxyethyl)-2-acetylnaphtho[2,3-b]furan-4,9-dione and 2-acetylnaphtho[2,3-b]furan-4,9-dione isolated (*Phytochemistry* 1993, *32*, 1015); specioside, verminoside and minecoside isolated from root bark (*Fitoterapia* 1993, *64*, 474).

NEW COMPOUNDS



Isopinnatal



Kigelinol
R = OH, R' = H
Isokigelinol
R = H, R' = OH

KNOXIA (Rubiaceae)

K. brachycarpa R.Br.; see *K. roxburghii* (Spreng.) M.A. Rau ssp. *brunonis* (Hook.f.) Bhattacharjee & Deb.var. *brunonis*

K. roxburghii (Spreng.) M.A. Rau ssp. *brunonis* (Hook.f.) Bhattacharjee & Deb var. *brunonis* syn. *K. brachycarpa* R.Br., *K. valerianoides* Thorel ex Pitard (*veleranoides*) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 419).

Isolation of three new anthraquinones - 2-ethoxymethylknoxiavaledin, 2-formylknoxiavaledin and 2-hydroxymethylknoxiavaledin - and their structure determination; knoxiadin, damnacanthal, nordamnacanthal, ibericin, 3-methylalizarin and damnacanthol also isolated (*Phytochemistry* 1990, *36*, 765).

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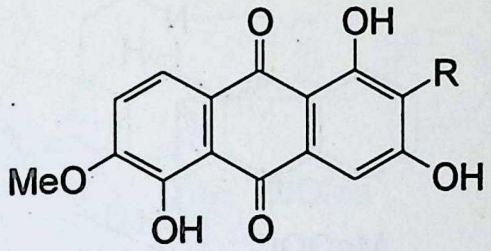

2-Ethoxymethylknoxiavaledin
R = CH_2OCH_2Me
2-Formylknoxiavaledin
R = CHO
2-Hydroxymethylknoxiavaledin
R = CH_2OH

K. valerianoides Thorel ex Pitard; see *K. roxburghii* (Spreng.) M.A. Rau ssp. *brunonis* (Hook.f.) Bhattacharjee & Deb. var. *brunonis*

KOCHIA (Chenopodiaceae)

K. scoparia (L.) Schrad. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 419).

Isolation of oleanolic acid and triacontane from fruits (*Zhongcaoyao* 1993, *24,* 5; *Chem. Abstr.* 1993, *119,* 91173 y).

KOKOONA (Celastraceae)

K. zeylanica Thw. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 420).

Isolation of celastranhydride (*Phytochemistry* 1990, *29,* 3189).

KOPSIA (Apocynaceae)

K. fruticosa A.DC. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 236).

Stereostructure and configuration of kopsine determined by X-ray analysis (*Acta Crystallogr., Cryst. Struc. Commun.* 1993, *49*C, 171; *Chem. Abstr.* 1993, *118,* 147856 x).

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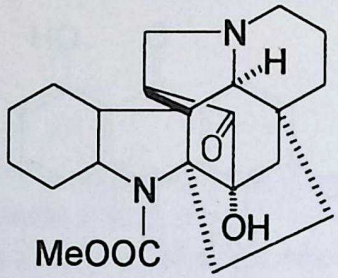

Kopsine

KUMMEROWIA (Papilionaceae)

K. striata (Thunb.) Schindl.; see *Lespedeza striata* (Thunb.) Hook. & Arn.

KURRIMIA (Celastraceae)

K. paniculata Wall. & Arn.; see *Bhesa paniculata* Arn.

LABLAB (Papilionaceae)

L. purpureus (L.) Sweet syn. *Dolichos lablab* L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 377).

Determination of linoleic (57.95), elaidic (15.05), stearic (11.26), palmitic (8.33), oleic (5.65), behenic (0.40) and arachidic (0.38%) acids in seed fixed oil (0.62%) by GLC (*Sci. Int.* 1989, *1,* 296; *Chem. Abstr.* 1990, *112,* 234162 n); alkaloid, trigonelline isolated (*Indian Drugs* 1990, *28,* 67); N-(3-aminopropyl)aminoethanol, N-(3-aminopropyl)aminopropanol, diaminopropane, putrescine, spermidine, spermine, thermospermine and aminopropyl-homospermidine identified in seeds by HPLC (*Phytochemistry* 1992, *31,* 893).

LACTUCA (Asteraceae)

L. scariola L. syn. *L. serriola* L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 403).

Linoleic (57.8), oleic (31.9), palmitic (6.6), stearic (2.0), linolenic (1.3) and myristic (0.3%) acids determined in seed oil by GC (*Sci. Int.* 1991, *3,* 67; *Chem. Abstr.* 1991, *115,* 179372 r); a new guaiane ester isolated from aerial parts and characterised as methyl 2-oxo-6α,15-dihydroxy-8α-(p-hydroxyphenylacetoxy)-guaia-1(10),3,11-trien-5αH-12-oate (I); 11β,13-dihydrolactucin, deacetoxymatricarin and loliolide also isolated (*Phytochemistry* 1992, *31,* 2539).

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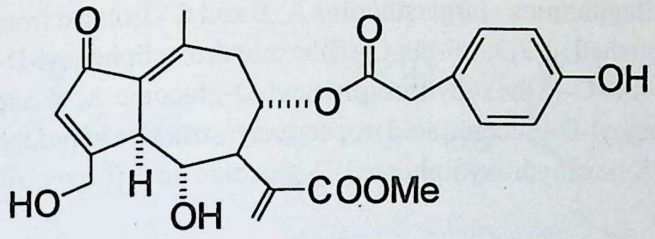

I

L. serriola L.; see *L. scariola* L.

LAGENARIA (Cucurbitaceae)

L. siceraria (Molina) Standl. syn. *L. vulgaris* Ser., *Cucurbita lagenaria* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 422).

Palmitic, stearic, oleic and linoleic acids identified in seed oil (38.0%) by GC-MS (*Riv. Ital. Sostanze Crasse* 1990, *67,* 259; *Chem. Abstr.* 1991, *115,* 27937 r).

L. vulgaris Ser.; see *L. siceraria* (Molina) Standl.

LAGERSTROEMIA (Lythraceae)

L. flosreginae Retz.; see *L. reginae* Roxb.

L. lanceolata Wall. ex Wt. & Arn.; see *L. microcarpa* Wight

L. microcarpa Wight syn. *L. lanceolata* Wall. ex Wt. & Arn., *L. thomsonii* Koehne (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 404).

Determination of linoleic (53.2), palmitic (17.8), oleic (11.1), stearic (8.8), vernolic (7.3) and arachidic (1.8%) acids in seed oil (*J. Oil Technol. Assoc. India* 1991, *23,* 53; *Chem. Abstr.* 1992, *117,* 44630 u).

L. reginae Roxb. syn. *L. speciosa* (L.) Pers., *L. flosreginae* Retz., p.p. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 404).

Alcoholic extract of leaves (250.0 mg/kg) given orally to mild alloxandiabetic albino rats produced significant hypoglycaemia as compared to that produced by tolbutamide (20.0 mg/kg), which persisted even two weeks after discontinuation of treatment (*Indian J. Pharmacol.* 1990, *22,* 174).

A new keto fatty acid isolated from seed oil and characterised as 9-keto-octadec-11(Z)-enoic acid (*Phytochemistry* 1990, *29,* 2323); isolation and structure determination of a new

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monomeric ellagitannin - flosin B - and two dimeric ellagitannins - reginins C and D - from leaves; pterocarinin A and 5-desgalloylpterocarinin A also isolated (*Chem. Pharm. Bull.* 1991, *39*, 647); three new ellagitannins - largerstannins A, B and C - isolated from fruits and leaves and their structures established as 2,3:4,6-bis-O-(S)hexahydroxydiphenoyl-D-gluconic acid, 2,3,5-O-(S,R)flavogalloyl-4,6-O-(S)hexahydrodiphenoyl-D-gluconic acid and 5-O-galloyl-4,6-O-(S)hexahydroxydiphenoyl-D-gluconic acid respectively; structure of punigluconin revised to 2,5-di-O-galloyl-4,6-O-(S)hexahydroxydiphenoyl-D-gluconic acid (*Chem. Pharm. Bull.* 1992, *40*, 2975).

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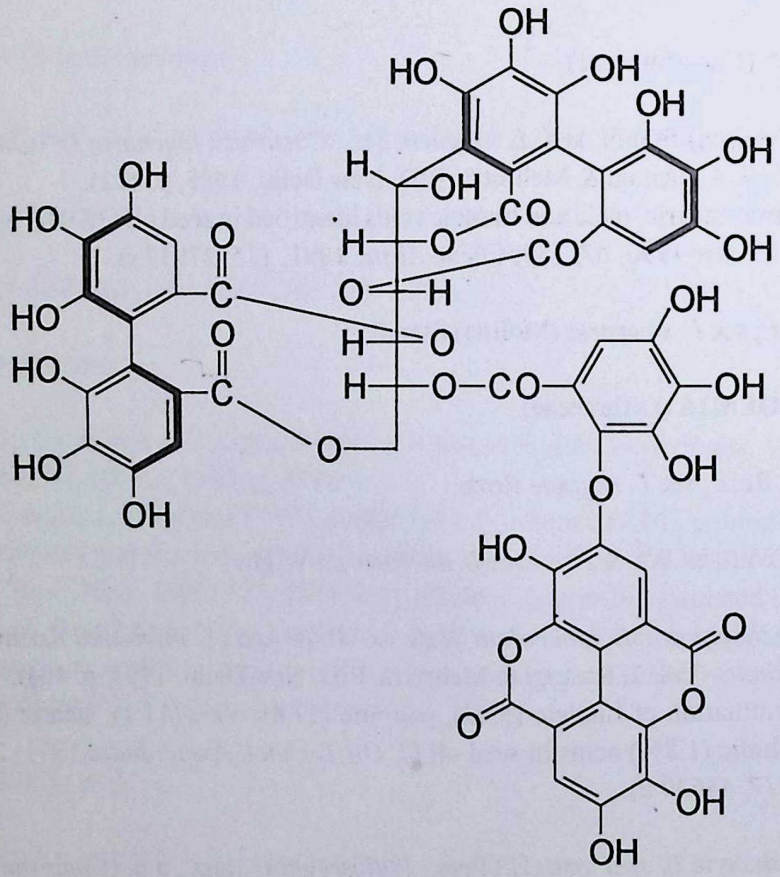

Flosin B

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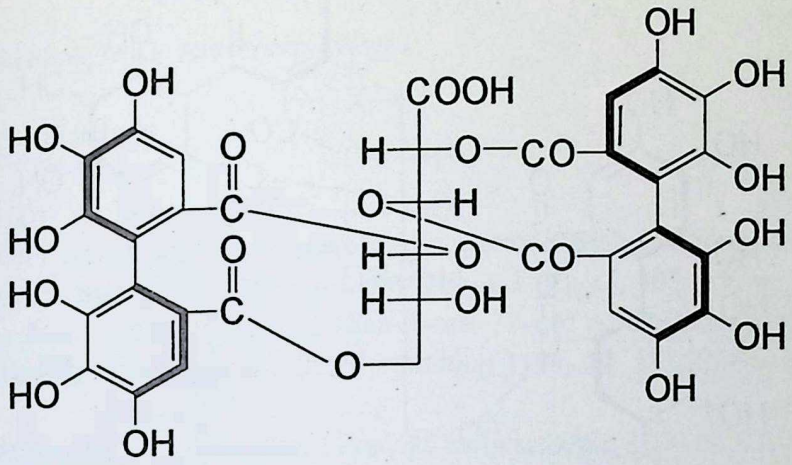
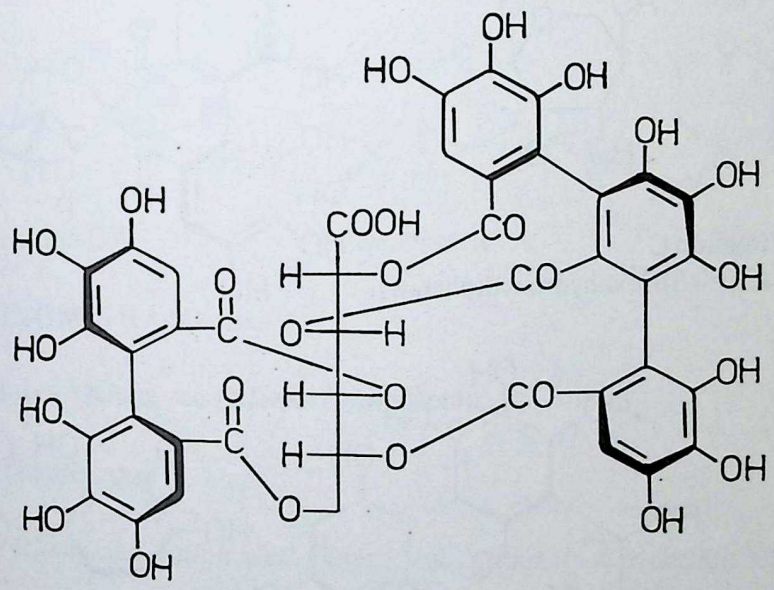
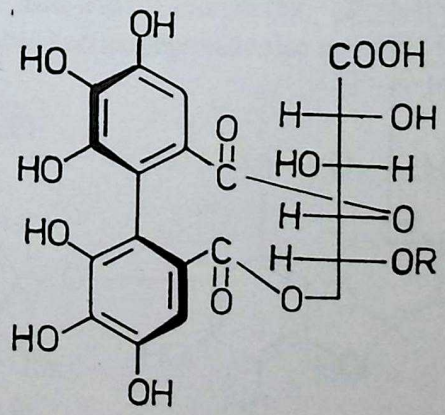


Lagerstannin A



Lagerstannin B



Lagerstannin C
R = Galloyl
Punigluconin
R = H

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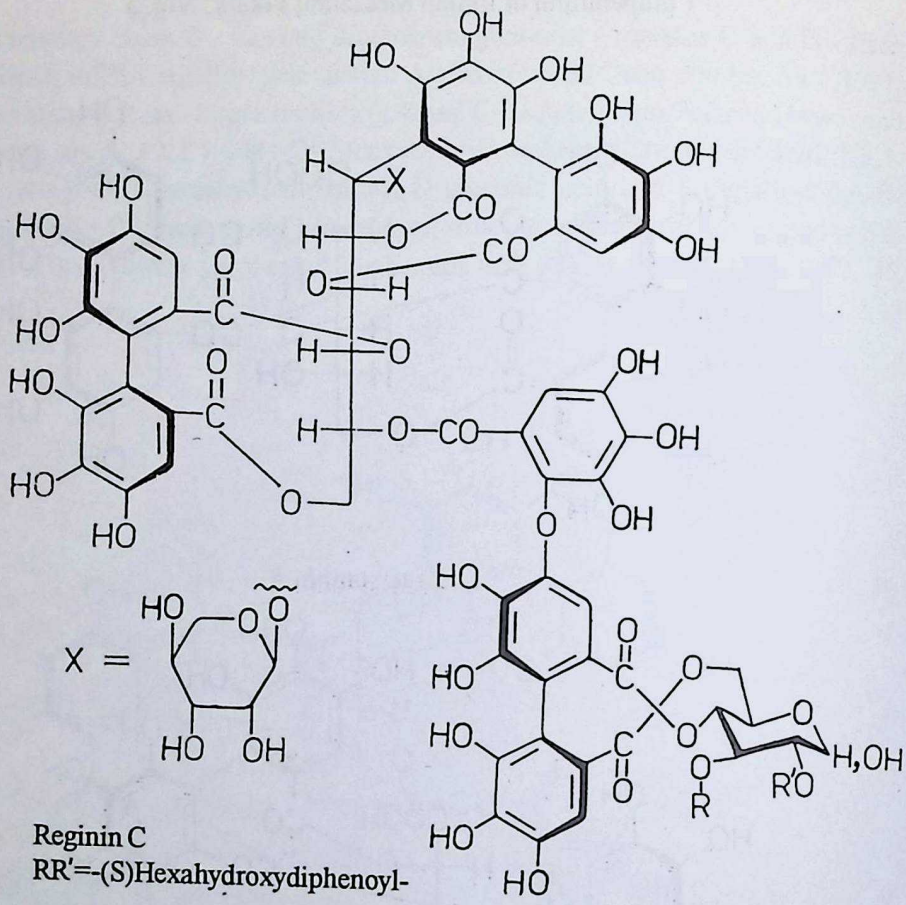
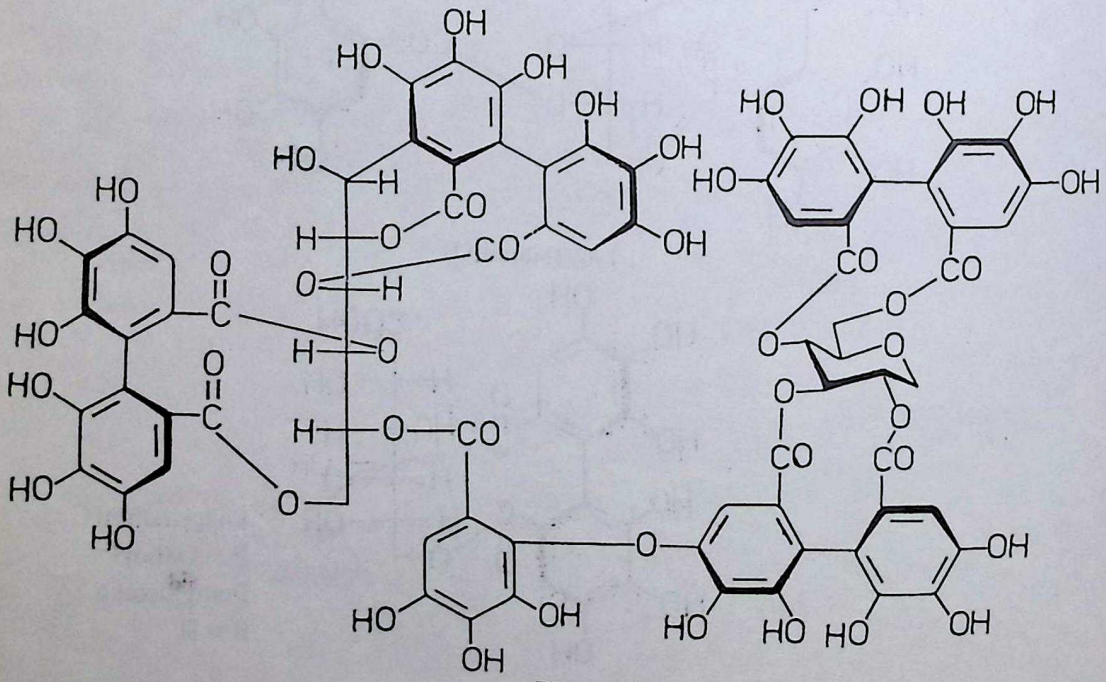


Reginin C
RR'=-(S)Hexahydroxydiphenoyl-



Reginin D

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L. speciosa (L.) Pers.; see *L. reginae* Roxb.

L. thomsonii Koehne; see *L. microcarpa* Wight

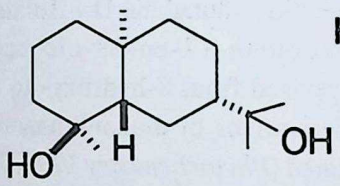
LAGGERA (Lamiaceae)

L. pterodonta (DC.) Sch.-Bip. ex Oliv.

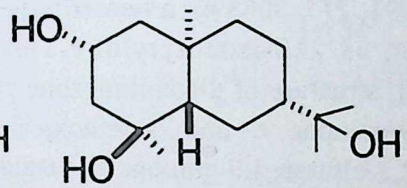
Three new sesquiterpenoids - pterodondiol, pterodontriol A and pterodontriol B - isolated and their structures established (*Yunnan Zhiwu Yanjiu* 1993, *15*, 303; *Chem. Abstr.* 1994, *120*, 129493 p); isolation of eudesm-4,11-dien-3-one-13-oic acid, ilicic acid, artemitin and chrysosplenetin B from aerial parts (*Huaxue Xuebao* 1994, *52*, 517; *Chem. Abstr.* 1994, *121*, 53978 y).

Distribution: Himalayas, from Himachal Pradesh eastwards, alt. 1200 m.

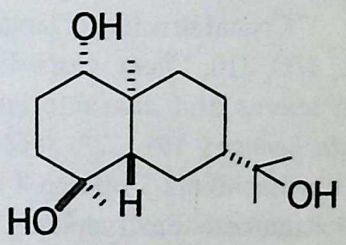
NEW COMPOUNDS



Pterodondiol



Pterodontriol A



Pterodontriol B

LAMIOPHLOMIS (Lamiaceae)

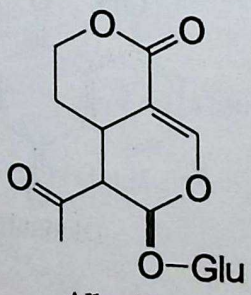
L. rotata (Benth.) Kudo; see *Phlomis rotata* Benth.

LAMIUM (Lamiaceae)

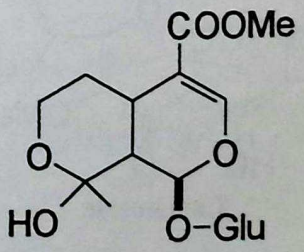
L. album L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 379).

Isolation of two new seco-iridoid glucosides - alboside A and alboside B - and their structure determination; lamalbid and caryoptoside also isolated (*Phytochemistry* 1992, *31*, 175).

NEW COMPOUNDS



Alboside A



Alboside B

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LANSIUM (Meliaceae)

L. domesticum Jack; see *Aglaia domestica* (Correa emend. Jack) Pellegrin

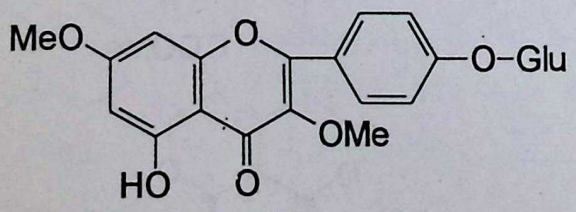
LANTANA (Verbenaceae)

L. camara L. syn. *L. camara* L. var. *aculeata* (L.) Moldenke (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 423).

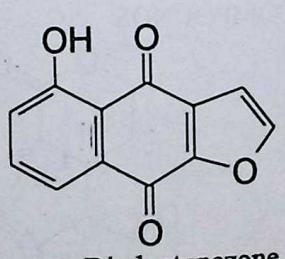
Alcoholic extractive of fresh leaves administered orally to rats induced photodermatitis on exposure to clear sunlight for 1 hr. The severity was related to dose of extract and was maximal in rats exposed for 4 to 14 hr after feeding extract, and gradually declined over 40 hr. Only light of wavelengths 540 to 570 mμ caused dermatitis. In a control study alcoholic extract of edible spinach leaves was only 1/3 as potent and its effect lasted for less than 20 hr. Extract did not cause liver injury but impaired excretion of bromsulphalein by liver, proportionate to dose and maximal at 5.5 hr, declining thereafter over 40 hr (*Indian J. Physiol. Pharmacol.* 1990, *34,* 13).

Crystal structure of lantadene A determined (*Acta Crystallogr., Cryst. Struct. Commun.* 1991, *47*C, 810; *Chem. Abstr.* 1991, *115,* 9083 e); a new triterpenoid - lantadene D - isolated from leaves and characterised as 22β-isobutyryloxy-3-oxoolean-12-en-28-oic acid (*Phytochemistry* 1990, *29,* 3961); structure of diodantunezone revised from 8-hydroxy- to 5-hydroxy-naphtho[2,3-b]furan-4,9-quinone; 6- and 7-methoxy derivatives of diodantunezone, isodiodantunezone and naphtho[2,3-b]furan-4,9-quinone also isolated (*Phytochemistry* 1991, *30,* 941); isolation of two new carbohydrates - lantanose A and lantanose B - from roots and their structure elucidation; stachyose, verbascose, ajugose, verbascotetrose and theviridoside also isolated (*Yaoxue Xuebao* 1992, *27,* 515; *Chem. Abstr.* 1993, *118,* 35863 r); roots afforded viridoside, theveside, geniposide, shanzhiside methyl ester, lamiridoside and 8-epiloganin (*Yaoxue Xuebao* 1992, *27,* 515; *Chem. Abstr.* 1993, *118,* 35863 r; *Zhongcaoyao* 1992, *23,* 12; *Chem. Abstr.* 1992, *116,* 231944 r); camaroside isolated from leaves and characterised as 5,4'-dihydroxy-3,7-dimethoxyflavone-4'-β-D-glucopyranoside; oleanolic acid, lantadene A, lantadene B, lantanilic acid and icterogenin also isolated (*Yaoxue Xuebao* 1993, *28,* 35; *Chem. Abstr.* 1993, *119,* 221613 e); isolation of a new triterpenoid - lantaiursolic acid - from roots and its structure determination as 3β-isovaleroyl-19α-hydroxyursolic acid, in addition lantanolic, 22β-O-angeloyllantanolic, oleanolic, 22β-hydroxyoleanolic and 19α-hydroxyursolic acids isolated (*Yaoxue Xuebao* 1993, *28,* 40; *Chem. Abstr.* 1993, *119,* 221614 f).

NEW COMPOUNDS



Camaroside



Diodantunezone

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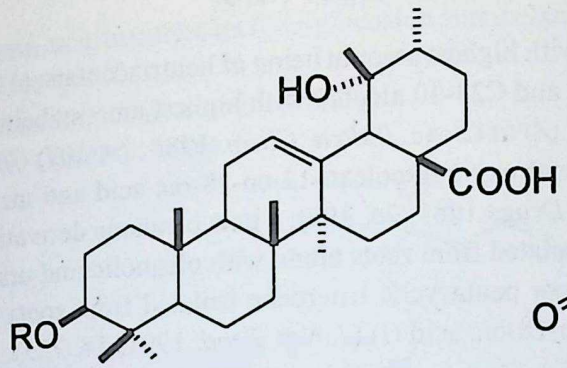
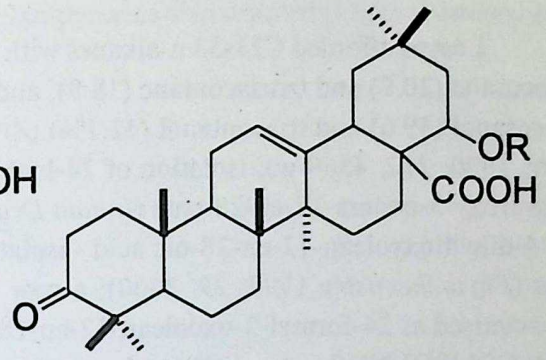
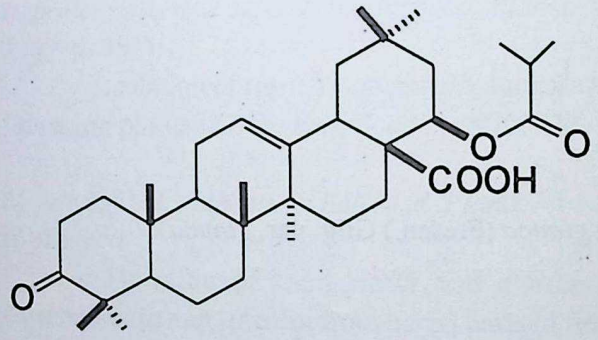


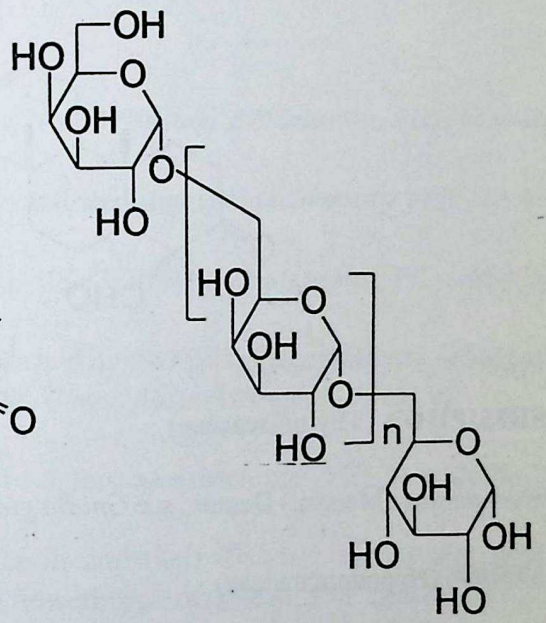
Lantaiursolic acid
R = Isovaleryl



Lantadene A
R = Tigloyl



Lantadene D



Lantanose A
n = 3
Lantanose B
n = 4

BIOLOGICAL ACTIVITY

Verbascoside inhibited protein kinase C from rat brain, MIC50 found to be 25.0 μM. Antitumor activity of verbascoside *in vitro* might partly be due to inhibition of protein kinase C (*J. Nat. Prod.* 1991, *54,* 1595).

L. camara L. var. *aculeata* (L.) Moldenke; see *L. camara* L.

L. indica Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 424).

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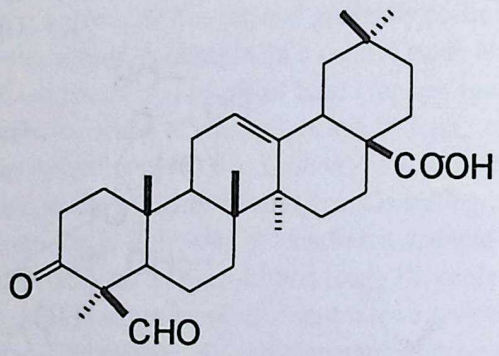
Leaves afforded C23-33 n-alkanes with highest amount being of hentriacontane (43.2), nonacosane (20.9) and tritriacontane (18.9), and C24-30 alcohol with highest amount being of octacosanol (39.6) and triacontanol (32.1%) (*Acta Cienc. Indica, Chem.* 1988, *14,* 107; *Chem. Abstr.* 1990, *112,* 4569 w); isolation of 24-hydroxy-3-oxoolean-12-en-28-oic acid and methyl 24-hydroxy-3-oxours-12-en-28-oate (*Indian Drugs* 1989, *26,* 395); a new oleanane derivative - 3β,24-dihydroxyolean-12-en-28-oic acid - isolated from roots along with oleanolic and ursolic acids (*Phytochemistry* 1990, *29,* 3660); a new pentacyclic triterpene isolated from roots and characterised as 24-formyl-3-oxoolean-12-en-28-oic acid (I) (*J. Nat. Prod.* 1991, *54,* 755).

NEW COMPOUNDS



I

LASIOSIPHON (Thymelaeaceae)

L. eriocephalus (Meissn.) Decne.; see *Gnidia glauca* (Fresen.) Gilg. var. *glauca*

LASTREA (Hypodemataceae)

L. filix-mas Presl var. *subtriangularis* (Hope) Bedd.; see *Dryopteris subtriangularis* (Hope) C. Chr.

L. pulvinulifera Bedd.; see *Dryopteris pulvinulifera* (Bedd.) O. Kuntze

L. pulvinulifera Bedd. var. *zeylanica* Bedd.; see *Dryopteris pulvinulifera* (Bedd.) O. Kuntze

L. sparsa Moore var. *zeylanica* Bedd.; see *Dryopteris pulvinulifera* (Bedd.) O. Kuntze

LATHRAEA (Orobanchaceae)

L. squamaria L.

A new iridoid disaccharide - 6'-O-glucosylmelampyroside - isolated and its structure

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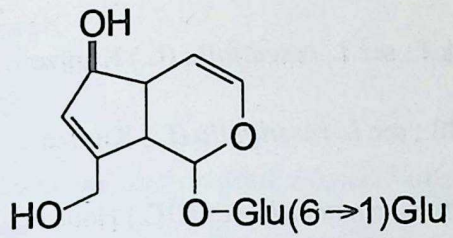
determined; aucubin, its 6'-O-glucoside and melampyroside also isolated (*Phytochemistry* 1993, *32*, 1489).

Distribution: Kashmir, alt. 1800 m.

NEW COMPOUNDS



6'-O-Glucosylmelampyroside

LATHYRUS (Papilionaceae)

L. odoratus L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 380).

N^6-Methylagmatine identified in seeds and seedlings (*Phytochemistry* 1990, *29,* 1313).

L. pratensis L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 381).

Isolation of rutin, isoquercitrin, luteolin and its 4'-O-β-D- glucoside from aerial parts of flowering plants (*Khim. Prir. Soedin.* 1990, 273; *Chem. Abstr.* 1990, *113,* 37751 y).

L. sativus L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 381).

Isolation of kaempferol and quercetin and their 7-O-α-L-rhamnofuranosides, formononetin and luteolin from aerial parts of flowering plants (*Khim. Prir. Soedin.* 1991, 424; *Chem. Abstr.* 1992, *117,* 66542 u); isoavenasterol and a mixture of clerosterol and 24-epiclerosterol isolated from seeds (*Phytochemistry* 1991, *30,* 4029); homoarginine and γ-aminobutyric acid identified in dry seeds and seedlings (*Planta Med.* 1992, *58,* 380); isolation of γ-glutamyl-β-(isoxazolin-5-on-2-yl)alanine from seedlings (*Phytochemistry* 1992, *31,* 887).

BIOLOGICAL ACTIVITY

Peritoneal injection of β-N-oxalylaminoalanine produced acute neurolathyrism at LD50 doses (748.8 mg/kg) in mice and (694.9 mg/kg) in chicken; liver and kidney cells showed granular denaturation, vacuolar and fatty degeneration. It is a neuropoison, mainly affecting central nervous system (*Zhongguo Nongye Kexue* 1989, *22,* 86; *Chem. Abstr.* 1990, *112,* 196809 u).

LAUNAEA (Asteraceae)

L. aspleniifolia (Willd.) Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 425).

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Determination of hexacosanol (0.2), ethyl palmitate (0.2), ethyl stearate (0.08), taraxasteryl acetate (0.02), taraxasterol (0.012), octacosanol (0.008), octacosanoic acid (0.006), stigmasterol (0.003) and taraxasterone (0.003%) (*Fitoterapia* 1989, *60*, 476).

L. chondrilloides (DC.) Hook.f.; see *L. resedifolia* (L.) Kuntze

L. mucronata (Forsk.) Muschl.; see *L. resedifolia* (L.) Kuntze

L. resedifolia (L.) Kuntze syn. *L. chondrilloides* (DC.) Hook.f., *L. mucronata* (Forsk.) Muschl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 425).

α-Amyrin, mortenol, lupeol and their acetates and esters isolated along with stigmast-7-enol and its 3-O-glucoside (*Egypt. J. Pharm. Sci.* 1990, *31*, 81; *Chem. Abstr.* 1990, *113*, 148859 j); isolation of luteolin, its 7-O-glucoside and 7-O-rhamnoside, apigenin-7-O-glucoside, esculetin, its 7-O-glucoside (cichoriin), ferulic acid and methyl caffeate from aerial parts (*Biochem. Syst. Ecol.* 1992, *20*, 187; *Chem. Abstr.* 1992, *117*, 86704 b).

LAURUS (Lauraceae)

L. nobilis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 426).

Isolation of D-gluco-L-glycero-3-octulose from fresh buds and young leaves (*Agric. Biol. Chem.* 1989, *53*, 2539); 1,8-cineole (26.7), eugenol (18.5), linalool (18.5) and sabinene (11.8%) determined in leaf oil by GC (*Nahrung* 1992, *36*, 494; *Chem. Abstr.* 1993, *119*, 47952 c); identification of 1,8-cineole as major components in leaf oil (*Egypt. J. Hortic.* 1992, *19*, 93; *Chem. Abstr.* 1994, *121*, 186746 t); a new germacrane derivative characterised as [4R,7S,11ξ,1(10)E,5E]12-acetoxygermacra-1(10),5-dien-4,11-diol (I) isolated from fruits along with eremanthin, dehydrocostuslactone and zaluzanin D (*Phytochemistry* 1992, *31*, 2537); fruits afforded 10-hydroxyoctacosanyl tetradecanoate, 1-docosanyl tetradecanoate and 11-hydroxytriacontan-9-one (*J. Nat. Prod.* 1992, *55*, 1315); (+)seco-isolariciresinol-9β-D-xyloside, (+)5'-methoxyisolariciresinol-9'β-D-xyloside, (Z)3-hexenyl-O-β-D-glucoside and schizandraside isolated from leaves (*Shoyakugaku Zasshi* 1992, *46*, 184; *Chem. Abstr.* 1993, *118*, 35873 u); determination of 1,8-cineole (28.37), α-phellandrene (10.07), α-pinene (9.30) and α-terpineol (5.85%) in fruit essential oil (*Parfuem. Kosmet.* 1992, *73*, 850; *Chem. Abstr.* 1993, *119*, 146313 b).

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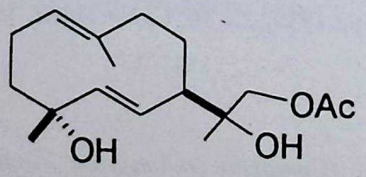

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LAVANDULA (Lamiaceae)

L. angustifolia Mill.; see *L. vera* DC.

L. officinalis Chaix.; see *L. vera* DC.

L. spica Loisel.; see *L. vera* DC.

L. stoechas L. ssp. *stoechas* (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 426).

Oleanolic, ursolic and vergatic acids, α-amyrin, its acetate, lupeol, luteolin, acacetin, vitexin, erythrodiol and β-sitosterol isolated (*Fitoterapia* 1989, *60,* 475); camphor (47.06), borneol (5.37), linalyl acetate and geranial (2.98 each), cineole (2.51), caryophyllene (2.37), α-terpineol (1.09), neral and pulegone (0.85), citronellol and fenchol (0.79 each), camphene (0.50), β-pinene and fenchone (0.45 each), α-pinene (0.42), β-terpineol (0.39), menthol (0.35), α-thujone (0.33%) and isoborneol (tr) determined in essential oil (*Sci. Int.* 1993, *5,* 99; *Chem. Abstr.* 1993, *119,* 210218 d).

L. vera DC. syn. *L. angustifolia* Mill., *L. officinalis* Chaix., *L. spica* Loisel. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 426).

Essential oil content of lavender flowers varied between 1.36 to 3.14%; increasing plant density within the usual range increased the yield of lavender oil (*Ege Univ. Ziraat Fak. Derg.* 1988, *25,* 135; *Chem. Abstr.* 1990, *113,* 168974 w); isolation and structure elucidation of 3β-formylursolic acid; in addition, betulin and ursolic, 19-hydroxyursolic, oleanolic and betulinic acids isolated (*Phytochemistry* 1992, *31,* 1424).

LAWSONIA (Lythraceae)

L. alba Lamk.; see *L. inermis* L.

L. inermis L. syn. *L. alba* Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 427).

A new aliphatic hydrocarbon isolated from stem bark and characterised as 3-methylnonacosan-1-ol (*Indian J. Chem.* 1992, *31*B, 705); isolation of a new sterol - lawsaritol - from roots and its structure elucidation as 24β-ethylcholest-4-en-3β-ol (*Phytochemistry* 1992, *31,* 2558); seed oil contained oleic, palmitic and linoleic acids as major components along with stearic, lauric and myristic acids (*J. Bangladesh Acad. Sci.* 1992, *16,* 263; *Chem. Abstr.* 1993, *118,* 209396 h); a new naphthoquinone - isoplumbagin - isolated from stem bark and its structure determined (*Phytochemistry* 1993, *33,* 723); isolation and structure elucidation of a new dihydroxysterol - lawsaritol A - from roots (*Nat. Prod. Lett.* 1994, *4,* 195; *Chem. Abstr.* 1994, *121,* 226372 b).

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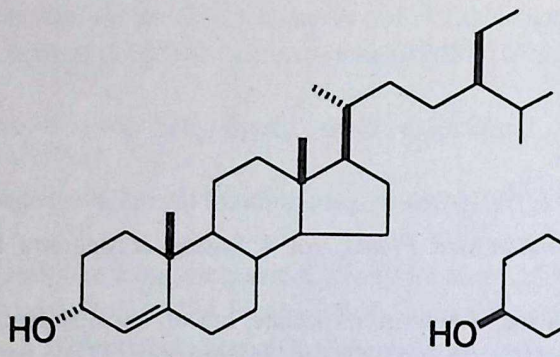
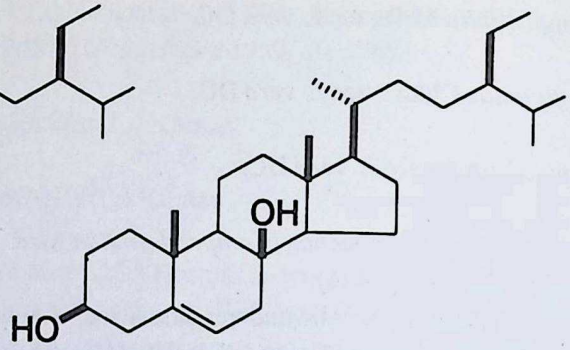
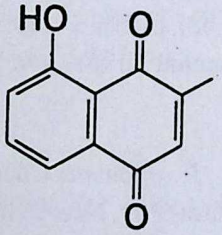


Lawsaritol



Lawsaritol A



Isoplumbagin

LEMNA (Lemnaceae)

L. paucicostata Hegelm.; see *L. perpusilla* Torrey

L. perpusilla Torrey syn. *L. paucicostata* Hegelm.

A flowering-inducing polypeptide isolated and partially characterised (*Plant Physiol.* 1991, *95,* 1288; *Chem. Abstr.* 1991, *114,* 244274 f).

Distribution: Throughout India, ascending to 1800 m in the hills.

BIOLOGICAL ACTIVITY

Protein at a concentration of 0.1 nM induced formation of lower buds of plant (*Plant Physiol.* 1991, *95,* 1288; *Chem. Abstr.* 1991, *114,* 244274 f).

LENS (Papilionaceae)

L. culinaris Medik. syn. *L. esculenta* Moench, *Ervum lens* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 428).

Seed lectin and root lectin isolated from seven-days old seedlings contained galactose (*Natl. Acad. Sci. Lett.* 1991, *14,* 305; *Chem. Abstr.* 1992, *116,* 124882 x); isolation of 24-methylene-

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25-methylcholesterol from seeds (*Phytochemistry* 1991, *30,* 4029); γ-glutamyl-β-(isooxazolin-5-on-2-yl)-alanine obtained from seedlings (*Phytochemistry* 1992, *31,* 887); a pseudotrisaccharide - ciceritol - isolated from seeds and characterised as α-D-galactosyl(1→6)-α-D-galactosyl(1→2)-4-O-methylchiro-inositol (*Agric. Food Chem.* 1993, *41,* 870; *Chem. Abstr.* 1993, *119,* 4953 m); seeds afforded glucose, fructose, raffinose, sucrose, stachyose, verbascose, kaempferol-3-O-α-L-rhamnosido-7-O-glucopyranoside and kaempferol-7-O-rutinoside (*Sb. Vys. Sk. Zermed. Praze. Fak. Agron., Rada* 1993, *55*A, 65; *Chem. Abstr.* 1993, *119,* 245527 f).

BIOLOGICAL ACTIVITY

Seed lectin showed greater haemagglutination activity than root lectin (*Natl. Acad. Sci. Lett.* 1991, *14,* 305; *Chem. Abstr.* 1992, *116,* 124882 x).

L. esculenta Moench; see *L. culinaris* Medik.

LEONOTIS (Lamiaceae)

L. leonurus R.Br. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 410).

Determination of β-caryophyllene (30.8), α-pinene (12.5), caryophyllene oxide (8.4), α-humulene (7.8) and limonene (5.6%) in essential oil from sepals (*J. Essent. Oil Res.* 1991, *3,* 451; *Chem. Abstr.* 1992, *116,* 27911 y).

LEPIDIUM (Brassicaceae)

L. sativum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 429).

Lepidimoide isolated as amorphous powder from mucilage of germinated seeds and characterised as sodium 2-O-rhamnosyl-4-deoxy-threo-hex-4-enopyranosiduronate (*Planta Physiol.* 1992, *100,* 1059; *Chem. Abstr.* 1993, *118,* 19226 e); total lipid content (13.8%) in seeds from central India (*J. Food Sci. Technol.* 1993, *30,* 54; *Chem. Abstr.* 1993, *119,* 115831 q).

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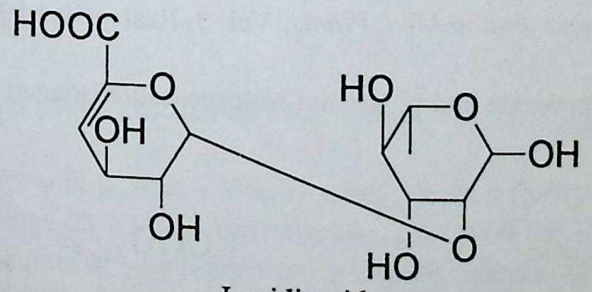

Lepidimoide

BIOLOGICAL ACTIVITY

Lepidimoide at >3.0 μM promoted and at >100.0 μM inhibited root growth of etiolated *Amaranthus caudatus* (*Planta Physiol.* 1992, *100,* 1059; *Chem. Abstr.* 1993, *118,* 19226 e).

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LEPTADENIA (Asclepiadaceae)

L. pyrotechnica (Forsk.) Decne. syn. *L. spartium* Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 430).

A new triterpenoid - leptadenol - isolated and its structure established (*Phytochemistry* 1992, *32,* 211).

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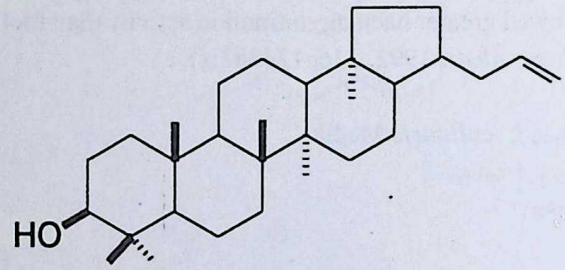

Leptadenol

L. reticulata (Retz.) Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 243).

Isolation of a new trisaccharide - leptaculatin - and its structure determination as O-β-D-glucosyl(1→4)-O-β-D-glucosyl(1→4)-β-D-cymaropyranose (*J. Carbohydr. Chem.* 1994, *13,* 75; *Chem. Abstr.* 1994, *121,* 53888 u).

L. spartium Wt. & Arn.; see *L. pyrotechnica* (Forsk.) Decne.

LESPEDEZA (Papilionaceae)

L. cuneata G.Don; see *L. juncea* (L.f.) Pers. var. *sericea* (Thunb.) Forbes & Hemsl.

L. juncea (L.f.) Pers. var. *sericea* (Thunb.) Forbes & Hemsl. syn. *L. sericea* (Thunb.) Miq., *L. cuneata* G.Don (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 388).

Potassium lespedezate and potassium isolespedezate isolated (*Tetrahedron* 1990, *46,* 383).

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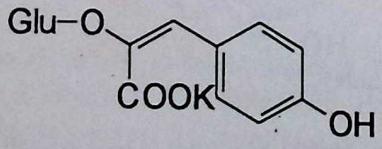
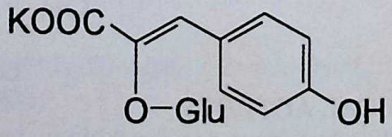


Potassium lespedezate



Potassium isolespedezate

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BIOLOGICAL ACTIVITY

Potassium lespedezate and potassium isolespedezate at 0.8 μM were quite effective in opening of leaf of *Cassia mimosoides* (*Tetrahedron* 1990, *46*, 283).

L. sericea (Thunb.) Miq.; see *L. juncea* (L.f.) Pers. var. *sericea* (Thunb.) Forbes & Hemsl.

L. striata (Thunb.) Hook. & Arn. syn. *Kummerowia striata* (Thunb.) Schindl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 430).

Isolation of genistein, isoorientin, isoquercitrin, isovitexin, kaempferol, quercetin, rutin, luteolin-7-O-glucoside, β-sitosterol and its glucoside from leaves and stems (*Annu. Rep. Tohoku Coll. Pharm.* 1989, 111; *Chem. Abstr.* 1991, *114*, 98212 r).

L. tomentosa (Thunb.) Sieb. ex Maxim. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 244).

Isorhamnetin-3-O-neohesperidoside, isorhamnetin-3-O-rutinoside, quercetin-3-O-glucoside, kaempferol-3-O-robinobioside and kaempferol-3-O-rhamnosyl(1→2)-galactoside isolated from aerial parts (*Shoyakugaku Zasshi* 1990, *44*, 257; *Chem. Abstr.* 1991, *114*, 171107 s; *Zhongcaoyao* 1992, *23*, 341; *Chem. Abstr.* 1992, *117*, 248556 j); a new flavanone isolated from root bark and characterised as 7,2',4'-trihydroxy-6,8,3'-triisoprenylflavanone (*Zhongguo Yaoke Daxue Xuebao* 1990, *21*, 337; *Chem. Abstr.* 1991, *114*, 203513 q).

LEUCAENA (Mimosaceae)

L.. leucocephala (Lamk.) de Wit (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 430).

Determination of linoleic (53.10), oleic (20.77), palmitic (14.74), stearic (6.17), behenic (1.76), linolenic (1.64), arachidic (1.28), palmitoleic (0.18), lauric (0.12) and myristic (0.10%) acids in seed fixed oil (6.93%) (*Pakistan J. Sci. Ind. Res.* 1989, *32*, 643; *Chem. Abstr.* 1990, *112*, 95581 h).

LEUCAS (Lamiaceae)

L. aspera (Willd.) Link (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 414).

A new triterpenoid lactone - leucolactone - isolated from roots and characterised as 3β,16α-dihydroxyoleanan-28→13β-olide (*Phytochemistry* 1990, *29*, 1693); isolation from shoots and structure determination of 1-hydroxytetratriacontan-4-one and 32-methyltetratriacontan-8-ol; dotriacontanol also isolated (*Phytochemistry* 1992, *31*, 1809).

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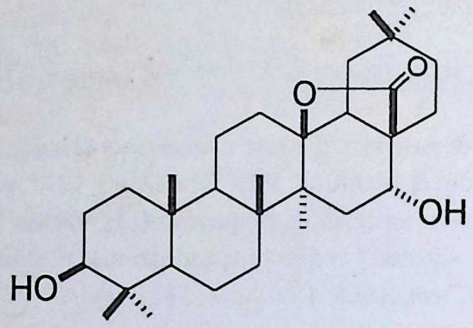

Leucolactone

L. nutans (Roth) Spreng.

H. - Chatia.

A new saponin - leucasin - isolated and characterised as 3-O-[β-D-glucosyl(1→2)-β-D-glucopyranosyl]-2α,3β-dihydroxy-lup-20(29)-ene; lupeol palmitate, sitosterol and stigmasterol also isolated (*Phytochemistry* 1991, *30,* 4181); a new diterpene fatty acid ester - trans-phytyl palmitate - isolated along with hentriacontane, dotriacontanol and phytol (*J. Nat. Prod.* 1991, *54,* 1444).

Distribution: Almost throughout India, in plains.

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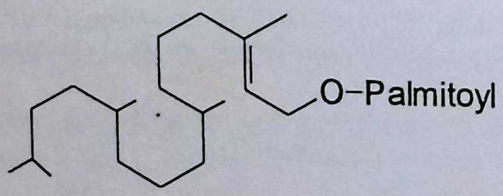
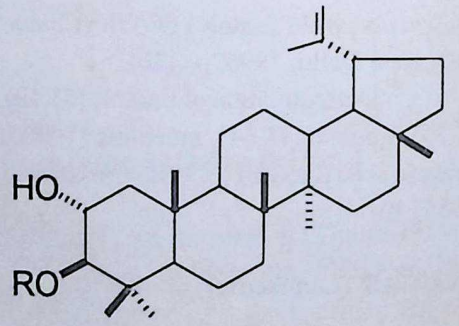


Trans-phytyl palmitate



Leucasin
R = Glu(2→1)Glu

LEUCOSCEPTRUM (Lamiaceae)

L. canum Smith

Isolation of a new labdane-type diterpene - isosclareol - from leaves and its structure determination; pectolinarigenin and β-sitosterol also isolated (*Yunnan Zhiwu Yanjiu* 1989, *11,* 263; *Chem. Abstr.* 1990, *112,* 175577 b).

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Distribution: Himalayas, from Kashmir to Bhutan, alt. 600-2400 m and Meghalaya, alt. 1200-1800 m.

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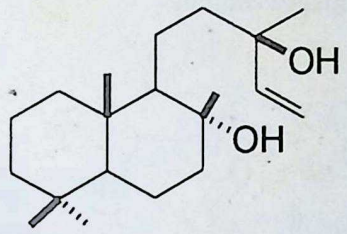


Isosclareol

LICUALA (Arecaceae)

L. spinosa Wurmb.

H. - Jangli salai.

Isolation of vitexin and methyl 25(S)protodioscin from leaves (*Chem. Pharm. Bull.* 1991, *39*, 2053).

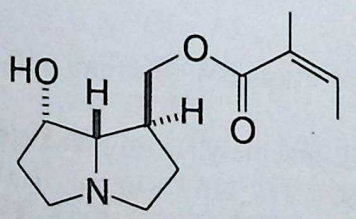
Distribution: Andaman Islands.

LIGULARIA (Asteraceae)

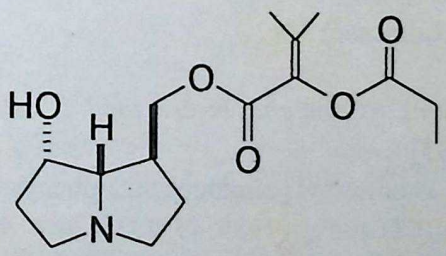
L. sibirica (L.) Cass. syn. *Senecio ligularia* Hook.f., p.p. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 389).

New pyrrolizidine alkaloids - racemocine and racemonine - isolated and their structures elucidated (*Heterocycles* 1991, *32,* 1729).

NEW COMPOUNDS



Racemocine



Racemonine

L. virgaurea (Maxim.) Mattf. ex Rehder & Kobuski

Three new benzofuranosesquiterpenes - 2-(3'-pentenyl)-3,7-dimethylbenzofuran-1,4-dione (I), 1-hydroxy-2-(3'-pentenyl)-3,7-dimethylbenzofuran (II) and 1-methoxy-2-(3'-pentenyl)-3,7-dimethylbenzofuran (III) - isolated from rhizomes and their structures elucidated; cacalol and 4αH-9-methoxyfurano-eremophilane also isolated (*Phytochemistry* 1991, *30,* 3132); isolation

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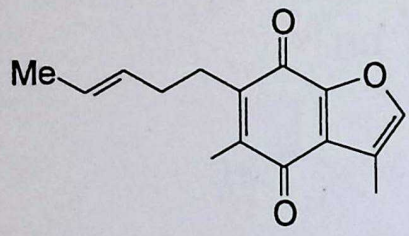
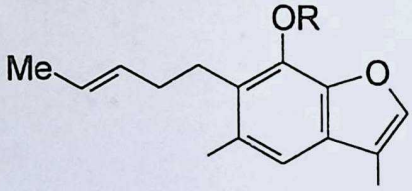
and structure determination of four new sesquiterpenes - furanomexican-9-en-8-one, 9β,10β-epoxyfuranomexican-8-one, virgauride and virgaurin A - from roots (*Chinese Chem. Lett.* 1991, *2*, 849; *Chem. Abstr.* 1992, *116*, 170233 j).

Distribution: Himalayas, from Nepal to Bhutan.

NEW COMPOUNDS



I



II
R = H
III
R = Me

LIGUSTRUM (Apiaceae)

L. lucidum Ait. syn. *L. nepalense* Wall. ex Roxb. var. *glabrum* Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 431).

Isolation of mannitol, rutin, luteolin-7-β-D-glucoside, apigenin-7-β-D-glucoside and quercetin from flower buds (*Zhongguo Zhongyao Zazhi* 1990, 168; *Chem. Abstr.* 1990, *113*, 20887 z).

L. nepalense Wall. ex Roxb. var. *glabrum* Hook.f.; see *L. lucidum* Ait.

LILIUM (Liliaceae)

L. candidum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 433).

2-Phenylethyl palmitate and 2-phenylethyl-α-L-arabinosyl(1→6)-β-D-glucoside isolated from petals (*Chem. Pap.* 1989, *43*, 793; *Chem. Abstr.* 1990, *112*, 115778 h); isolation and structure elucidation of new dimeric alkaloids - 5,5'-oxydi-3-methyl-3-pyrrolin-2-one and 5-hydroxy-3-methyl-1-(3'-methyl-2'-oxo-3'-pyrrolin-5'-yl)-3-pyrrolin-2-one - from bulbs (*Collect. Czech. Chem. Commun.* 1991, *56*, 436; *Chem. Abstr.* 1991, *115*, 5133 y); lilaline, jatropham, its ethyl derivative, kaempferol, R(+)methylsuccinic acid, 2-phenylethyl palmitate, 2-phenylethyl-α-L-arabinosyl(1→6)-β-D-glucoside and a mixture of β-sitosterol, stigmasterol and campesterol isolated (*Acta Fac. Pharm. Univ. Comenianae* 1991, *45*, 151; *Chem. Abstr.* 1992, *116*, 55525 u); isolation of jatropham, ethyljatropham and citraconimide (*Chem. Pap.* 1991, *45*, 709; *Chem.*

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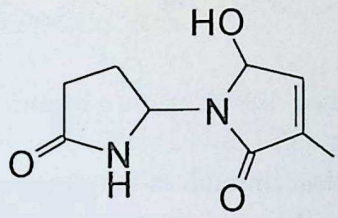
Abstr. 1992, *116,* 102706 r); a new alkaloid - 1-(2'-oxo-5'-pyrrolidinyl)-5-hydroxy-3-methyl-3-pyrrolin-2-one (I) - isolated from bulbs and its structure determined (*Phytochemistry* 1992, *31,* 1084).

NEW COMPOUNDS



I

L. macklineae Sealy

Isolation of new phenolics from bulbs and their characterisation as methyl regaloside D, regaloside J, regaloside K, regaloside L, 4,4'-di-O-acetyl-3,6'-di-O-feruloylsucrose, 3,4'-di-O-p-coumaroylsucrose, 3,6'-di-O-p-coumaroylsucrose, 2'-O-acetyl-3,4'-di-O-p-coumaroylsucrose and 3'-O-acetyl-3,4'-di-O-p-coumaroylsucrose (*Chem. Pharm. Bull.* 1991, *39,* 2362).

Distribution: Manipur.

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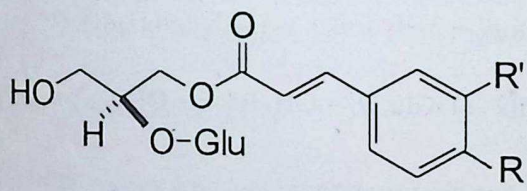

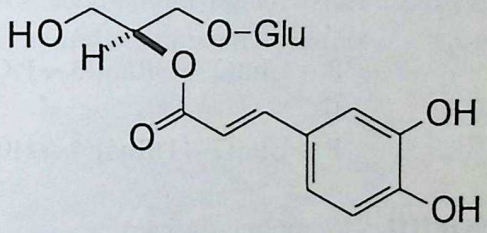

Methyl regaloside D
R = OMe, R' = H
Regaloside J
R,R' = H
Regaloside K
R,R' = OH

Regaloside L

L. regale Wils. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 434).

Isolation and structure determination of a new phenolic amide - N-(4-methylsuccinimido-n-butyl)-p-coumaramide - from bulbs; 3,6'-O-diferuloylsucrose also isolated (*Chem. Pharm. Bull.* 1990, *38,* 541); two new steroidal saponins isolated from bulbs and characterised as 25(R)27-O-[(S)3-hydroxy-3-methylglutaroyl]-spirost-5-en-3β,27-diol-3-O-α-L-rhamnosyl(1→2)-O-[β-D-glucosyl(1→3)]-β-D-glucoside (I) and 25(S)spirost-5-en-3β,17α,27-triol-3-O-α-L-rhamnosyl-(1→2)-O-[β-D-glucosyl(1→2)-O-β-D-glucosyl(1→4)]-β-D-glucoside (II); in addition, gracilin, trigofoenoside D-1 and brownioside isolated (*Phytochemistry* 1993, *33,* 675).

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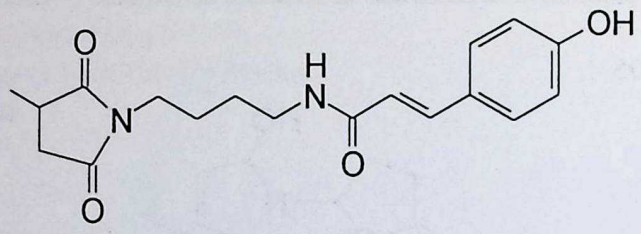
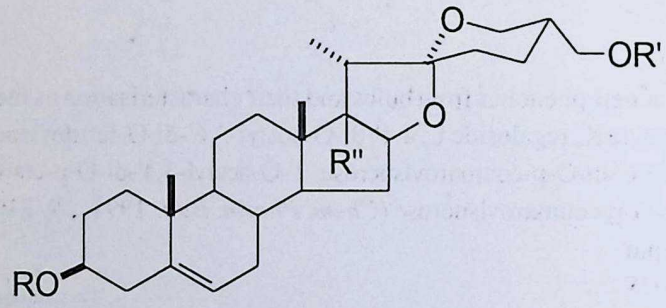


N-(4-Methylsuccinimido-n-butyl)-p-coumaramide



I

R = Glu[(2→1)Rha](3→1)Glu, R' = 3-Hydroxy-3- methylglutaroyl, R" = H

II

R = Glu[(2→1)Rha](4→1)Glu(2→1)Glu, R' = OH, R" = α-OH

LIMNOPHILA (Scrophulariaceae)

L. conferta Benth.; see *L. repens* (Benth.) Benth.

L. heterophylla (Roxb.) Benth. syn. *L. heterophylla* (Roxb.) Benth. var. *reflexa* (Benth.) Hook.f.

Hymenoxin isolated (*Int. J. Pharmacog.* 1991, *29,* 145; *Chem. Abstr.* 1991, *115,* 142087 a).

Distribution: Throughout India.

L. heterophylla (Roxb.) Benth. var. *reflexa* (Benth.) Hook.f.; see *L. heterophylla* (Roxb.) Benth.

L. repens (Benth.) Benth. syn. *L. conferta* Benth.

Mal. - Munganari; Mundari - Muchri-ara.

Oil possessed good anthelmintic activity. Crude alcohol extract of plant after removal of oil, significantly reduced epithelization period compared to that of controls in excision wound models.

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α-Phellandrene (52.2) and thymol (38.2%) determined in essential oil (*Int. J. Pharmacog.* 1991, *29,* 145; *Chem. Abstr.* 1991, *115,* 142087 a).
Distribution: Throughout India.

L. roxburghii G.Don; see *L. rugosa* (Roth) Merr.

L. rugosa (Roth) Merr. syn. *L. roxburghii* sensu Hook.f. (non G.Don) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 435).

Ursolic acid and hentriacontanol isolated from whole plant (*J. Indian Chem. Soc.* 1990, *67,* 89); a new flavone isolated and characterised as 5-hydroxy-7,2',4'-trimethoxyflavone (*Fitoterapia* 1990, *61,* 366); isolation of 3β-hydroxy-lup-20(29)-en-27-oic acid, nevadensin and demethoxysudachitin from whole herb (*Chung-hua Yao Hsueh Tsa Chih* 1991, *43,* 35; *Chem. Abstr.* 1991, *114,* 221057 y); betulin and betulinic acid isolated (*J. Indian Chem. Soc.* 1992, *69,* 411).

BIOLOGICAL ACTIVITY

Nevadensin (3.1 mg/kg, i.v.) exhibited hypotensive effect on both normotensive and spontaneously hypertensive rats under pentobarbital anaesthesia. It decreased mean arterial pressure of rats by about 50 mm Hg for 30 min (*Chung-hua Yao Hsueh Tsa Chih* 1991, *43,* 35; *Chem. Abstr.* 1991, *114,* 221057 y); nevadensin showed good anti-inflammatory activity in acute inflammation model and moderate cytotoxic and antitubercular activities (*Int. J. Pharmacog.* 1991, *29,* 145; *Chem. Abstr.* 1991, *115,* 142087 a).

LIMONIA (Rutaceae)

L. acidissima L.; see *Naringi crenulata* (Roxb.) Nicolson

L. alata Wall. ex Wt. & Arn.; see *Naringi alata* (Wall. ex Wt. & Arn.) Ellis

L. crenulata Roxb.; see *Naringi crenulata* (Roxb.) Nicolson

L. pubescens Wall. ex Hook.f.; see *Harrisonia perforata* (Blanco) Merr.

L. spectabilis Lindl; see *Ravenia spectabilis* Engl.

LINARIA (Scrophulariaceae)

L. cymbalaria Mill.; see *Cymbalaria muralis* Gaertn., Mey. & Schreb.

L. ramosissima Wall.; see *Kickxia ramosissima* (Wall.) Janchen

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LINDELOFIA (Boraginaceae)

L. longiflora (Benth.) Baill. var. *longiflora* syn. *L. spectabilis* Lehm.

Echinatin and its N-oxide isolated (*Fitoterapia* 1990, *61*, 89).

Distribution: Himalayas, from Kashmir to Garhwal, alt. 3000-3600 m.

L. spectabilis Lehm.; see *L. longiflora* (Benth.) Baill. var. *longiflora*

LINDERA (Lauraceae)

L. neesiana (Nees) Kurz (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 436).

Methyl laurate (75.2), methyl caprate (13.3), methyl oleate (5.4), methyl myristate (2.4) and methyl palmitate (0.5%) determined in seeds (*Indian J. Nat. Prod.* 1991, *7*(2), 17; *Chem. Abstr.* 1992, *117*, 147228 y).

LINUM (Linaceae)

L. usitatissimum L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 391).

Plant contained HCN (0.0486%) (*Sci. Int.* 1990, *2*, 311; *Chem. Abstr.* 1992, *116*, 124847 q); isolation of oleic, linoleic and linolenic acids and isofucosterol from seeds (*Tokyo Gakugei Daigaku Kiyo, Dai-4-bumon* 1993, *45*, 27; *Chem. Abstr.* 1994, *120*, 240094 y); a new phenylpropanoid glucoside - linusitamarin - isolated from defatted seeds and its structure elucidated (*J. Nat. Prod.* 1993, *56*, 2012).

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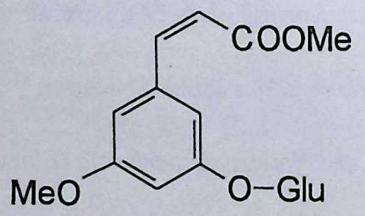

Linusitamarin

LIPPIA (Verbenaceae)

L. alba (Mill.) N.E.Br.; see *L. javanica* (Burm.f.) Spreng.

L. geminata H.B. & K.; see *L. javanica* (Burm.f.) Spreng.

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L. javanica (Burm.f.) Spreng. syn. *L. geminata* H.B. & K., *L. alba* (Mill.) N.E.Br. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 392).

Oil exhibited strong antifungal activity against *Trichophyton mentagrophytes interdigitale* and *Candida albicans* (*J. Essent. Oil Res.* 1990, *2,* 265; *Chem. Abstr.* 1991, *114,* 12046 e).

Citral, neral and geranial identified in essential oil by GC (*J. Essent. Oil Res.* 1990, *2,* 265; *Chem. Abstr.* 1991, *114,* 12046 e); determination of camphor (18.20), 1,8-cineole (16.5) and β-cubebene (6.9%) in leaf oil (*Flavour Fragrance J.* 1990, *5,* 107; *Chem. Abstr.* 1990, *113,* 84689 u); γ-terpinene (46.71), p-cymene (8.65), β-caryophyllene (7.23), myrcene (1.32), geraniol (0.69) and neral (0.39%) determined in essential oil (*Rev. Bras. Farm.* 1993, *74,* 29; *Chem. Abstr.* 1994, *120,* 116473 g).

LIQUIDAMBAR (Altingiaceae)

L. formosana Hance (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 436).

Two pentacyclic triterpene aldehydes - liquidambronal and ambronal - isolated from nonvolatile part of resin along with bornyl trans-cinnamate (*Youji Huaxue* 1991, *11,* 508; *Chem. Abstr.* 1992, *116,* 148184 x); isolation and structure determination of isorugosin E (*Tetrahedron* 1991, *47,* 3575; *Basic Life Sci.* 1992, *59,* 195; *Chem. Abstr.* 1994, *120,* 73353 y); a new trimer - isorugosin G - isolated from leaves and its structure established (*Basic Life Sci.* 1992, *59,* 195; *Chem. Abstr.* 1994, *120,* 73353 y).

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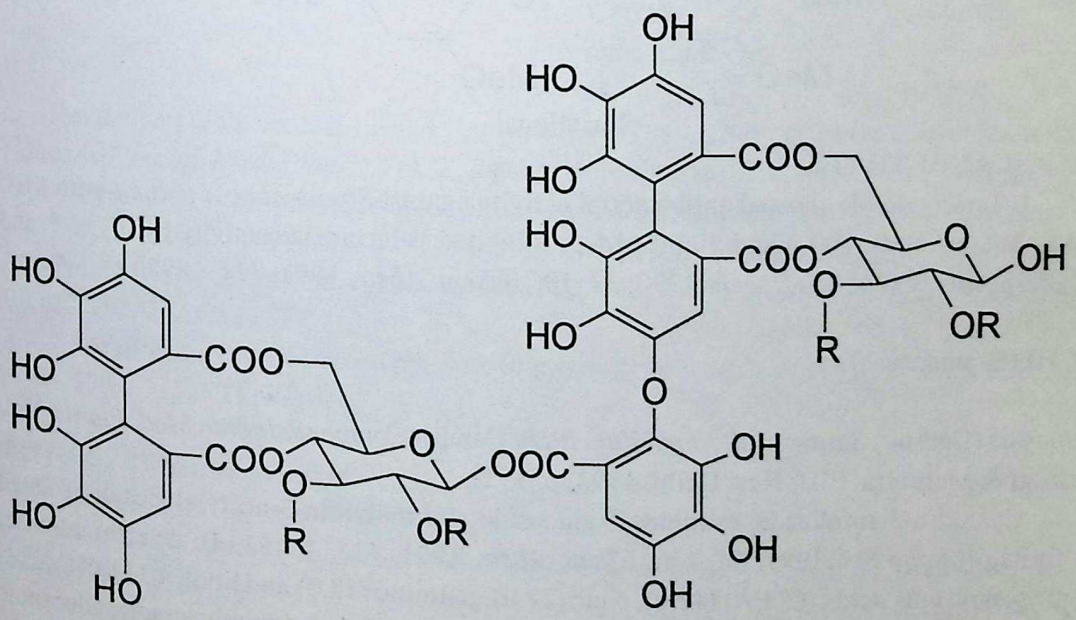

Isorugosin E
R = Galloyl

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L. styraciflua L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 392).

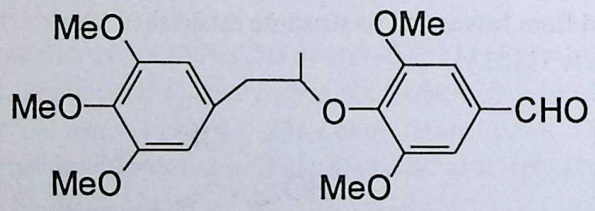
Terpinen-4-ol, α-pinene and sabinene identified as major constituents in leaf oil (*Planta Med.* 1989, *55,* 316).

LIRIODENDRON (Magnoliaceae)

L. tulipifera L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 438).

A new lignan - liriolignal - isolated from seeds and its structure determined; lipiferolide, epitulipinolide diepoxide, peroxyferolide, α- and β-liriodenolides, lirioresinol B dimethyl ether, β-O-dilignol and eudesmin also isolated (*J. Nat. Prod.* 1989, *52,* 1177); β-liriodenolide isolated from leaves (*Yakhak Hoechi* 1990, *34,* 106; *Chem. Abstr.* 1991, *114,* 68920 c); glutamic acid (3.7%) obtained by acid hydrolysis of flavoprotein isolated from foliar parts (*Uzb. Biol. Zh.* 1990, 63; *Chem. Abstr.* 1991, *114,* 244267 f); nonphenolic fraction of alkaloids contained remerine, lirimidine, nornuciferine, nuciferine and glaucine whereas phenolic fraction consisted of caaverine, isocoripalmine, N-methylcrotsparine, stepholidine and apoglazovine (*Khim. Prir. Soedin.* 1991, 587; *Chem. Abstr.* 1992, *117,* 108220 v).

NEW COMPOUNDS



Liriolignal

BIOLOGICAL ACTIVITY

β-Liriodenolide showed antibacterial activity against *Streptococcus mutans* with MIC 100.0 μg/ml. At 50.0, 100.0 and 200.0 μM, it inhibited β-lactamase activity by 0.7, 3.5 and 19.7% respectively (*Yakhak Hoechi* 1990, *34,* 106; *Chem. Abstr.* 1991, *114,* 68920 c).

LITCHI (Sapindaceae)

L. chinensis (Gaertn.) Sonner syn. *Nephelium litchi* Camb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 393).

Cyanidin-3-rutinoside, cyanidin-3-glucoside and malvidin-3-acetylglucoside isolated from fruits (*J. Food Sci.* 1991, *56,* 466; *Chem. Abstr.* 1991, *115,* 134529 f); determination of cyclopropanoic fatty acids (CPFA) (42.0), oleic (27.0), palmitic (12.0) and linoleic (11.0%) acids in seed lipids; CPFA fraction contained hydrosterculic (37.0), cis-7,8-methylenehexadecanoic (4.0), cis-5,6-methylene-tetradecanoic (0.4) and cis-3,4-methylenedodecanoic (0.1%) acids (*J. Agric. Food Chem.* 1993, *41,* 886; *Chem. Abstr.* 1993, *119,* 26994 c).

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LITHOCARPUS (Fagaceae)

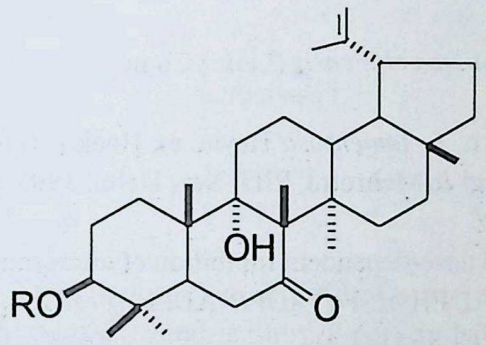
L. elegans (Blume) Hatus ex Soepadmo syn. *Quercus spicata* Smith, *Q. spicata* Smith var. *glaberrima* (Blume) Miq., *Q. spicata* Smith var. *microcalyx* (Korth.) Miq., *Q. spicata* Smith var. *gracilipes* (Miq.) Miq., *Q. spicata* Smith var. *depressa* (Blume) King, *Q. spicata* Smith var. *chittagonga* Hook.f., *Q glomerata* Roxb.

Beng. - Bara chakma; Nep. - Arkaula; Assam - Temi-sakho.

Isolation and structure elucidation of two new triterpenes - querspicatin A and querspicatin B - from bark; lupeol and hexacosanoic acid also isolated (*Phytochemistry* 1989, *28,* 3437 y).

Distribution: Himalayas, from Nepal eastward, Assam and Manipur, ascending to 1800 m.

NEW COMPOUNDS



Querspicatin A
R = Caffeoyl
Querspicatin B
R = H

L. polystachya (Wall. ex DC.) Rehd. (*polystachyus*) syn. *Quercus polystachya* Wall. ex DC. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 419).

Isolation of phlorizin, hydroxyphlorizin and trilobatin from leaves (*Zhongcaoyao* 1991, *22,* 99; *Chem. Abstr.* 1991, *115,* 203279 p); leaves afforded cernuoside, afzelin, isoquercitrin and 2"-p-coumarylastragalin (*Zhongcaoyao* 1991, *22,* 198; *Chem. Abstr.* 1991, *115,* 228326 q).

BIOLOGICAL ACTIVITY

Trilobatin lowered blood pressure in rats and rabbits (*Zhongcaoyao* 1991, *22,* 99; *Chem. Abstr.* 1991, *115,* 203279 p).

LITHOSPERMUM (Boraginaceae)

L. arvensis L. (*arvense*) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 438).

Isolation of quercetin, its 3-glucoside, astragalin, rutoside and kaempferol-glucorhamnoside (*Herba Pol.* 1992, *38,* 63; *Chem. Abstr.* 1993, *119,* 45218 u); acetyl, isobutyryl,

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isovaleryl and hydroxyisovaleryl esters of shikonin identified in roots by HPLC (*Acta Pol. Pharm.* 1993, *50*, 443; *Chem. Abstr.* 1994, *121*, 200860 j).

L. euchromon Royle (*euchromum*); see *Arnebia euchroma* (Royle) Johnston

LITOBRANCHIA (Dennstaedtiaceae)

L. aurita Bedd.; see *Histiopteris incisa* (Thunb.) J.Sm.

L. incisa Presl; see *Histiopteris incisa* (Thunb.) J.Sm.

LITSEA (Lauraceae)

L. chinensis Lam.; see *Neolitsea chinensis* (Lam.) Chun

L. deccanensis Gamble syn. *L. tomentosa* Heyne ex Hook.f. (non Blume) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 438).

BIOLOGICAL ACTIVITY

Boldine produced dose-dependent inhibition of microsomal lipid peroxidation induced by Fe^{2+}/ascorbate, CCl_4/NADPH or Fe^{3+}ADP/NADPH (*Free Radical Res. Commun.* 1993, *18*, 167; *Chem. Abstr.* 1993, *119*, 195131 z).

L. glutinosa (Lour.) C.B. Robins; see *Neolitsea chinensis* (Lam.) Chun

L. sebifera Pers.; see *Neolitsea chinensis* (Lam.) Chun

L. tomentosa Blume; see *L. decanensis* Gamble

L. zeylanica Nees; see *Neolitsea cassia* (L.) Kostermans

LOBELIA (Lobeliaceae)

L. cardinalis L.

Eng. - Cardinal flower.

Two new triterpenes isolated from whole plant and characterised as urs-3β,21β-dihydroxy-12-en-28-oic acid and urs-21β-hydroxy-3-oxo-12-en-28-oic acid; oleanolic acid, olean-3β,24-dihydroxy-12-en-28-oic acid, olean-12-en-28-oic acid, ursolic acid, β-sitosterol and β-daucosterol also isolated (*Gaodeng Xuexiao Huaxue Xuebao* 1993, *14*, 1391; *Chem. Abstr.* 1994, *120*, 319349 u).

Distribution: Introduced into Indian gardens.

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L. inflata L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 248).

Methanolic extract of leaves exhibited antidepressant activity (*J. Pharm. Sci.* 1992, *81,* 620).

Two new polyacetylenes - lobetyolin and lobetyol - isolated from root culture and characterised as 9-O-β-D-glucosyl-2,10-tetradecadien-4,6-diyne-8,14-diol and 2,10-tetradecadien-4,6-diyne-8,9,14-triol respectively (*Phytochemistry* 1991, *30,* 2255); β-amyrin palmitate isolated (*J. Pharm. Sci.* 1992, *81,* 620).

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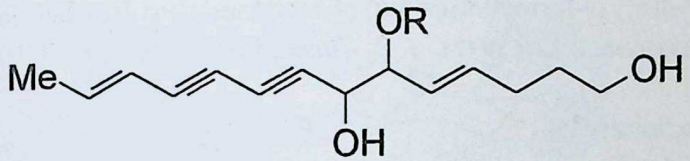

Lobetyolin
R = Glu
Lobetyol
R = H

BIOLOGICAL ACTIVITY

Effects of β-amyrin palmitate studied on CNS of mice and compared with those of mianserin and imipramine. In forced swimming test, β-amyrin palmitate reduced duration of immobility of mice significantly in dose-dependent manner (5.0, 10.0 and 20.0 mg/kg). At same dosage it elicited dose-related reduction in locomotor activity, antagonised locomotor stimulation induced by methamphetamine and potentiated narcosis induced by sodium pentobarbitone. Thus, β-amyrin palmitate showed antidepressant activity with mianserin-like profile of action (*J. Pharm. Pharmacol.* 1993, *45,* 545).

L. nicotianaefolia Roth ex Roem. & Schult. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 422).

BIOLOGICAL ACTIVITY

(–)Lobeline produced dose-related shortening of low intensity thermally-evoked tail avoidance response (eg. hyperalgesia) when microinjected into dorsal posterior mesencephalic tegmentum of conscious rats. Its hyperalgesic potency was greater than that of morphine (*Pharmacol. Biochem. Behav.* 1994, *47,* 197; *Chem. Abstr.* 1994, *120,* 45843 q).

LOBULARIA (Brassicaceae)

L. maritima (L.) Desv. syn. *Alyssum maritima* Lamk. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 395).

Kaempferol, its 7-rhamnoside, 3-glucosido-7-rhamnoside and 3-diglucoside and quercetin-7-glucoside isolated (*Herba Pol.* 1989, *35,* 85; *Chem. Abstr.* 1991, *115,* 179323 a).

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LOCHNERA (Apocynaceae)

L. rosea (L.) Reichb.; see *Catharanthus roseus* (L.) G.Don

LOLIUM (Poaceae)

L. temulentum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 439).

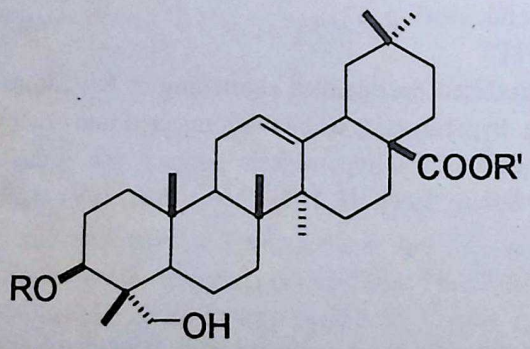
Synthesis of gibberellin A35 and 11β-hydroxygibberellin A7 (*Tetrahedron Lett.* 1990, *31,* 423); N-acetylloline, N-formylloline and N-acetylnorloline isolated; loline identified as an artifact (*Pharm. Pharmacol. Lett.* 1991, *1,* 7; *Chem. Abstr.* 1992, *116,* 170206 c).

LONICERA (Caprifoliaceae)

L. japonica Thunb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 440).

Determination of chlorogenic acid in main root (1.48), side roots (1.80), stem (1.47) and leaves (1.35%); isochlorogenic acid (2.52%) determined in leaves (*Zhongguo Yaoxue Zazhi* 1991, *26,* 145; *Chem. Abstr.* 1991, *115,* 275738 k); isolation of hydnocarpin, quercetin, ochnaflavone, its 4'-methyl ether, astragalin, isoquercitrin and rhoifolin from aerial parts (*Arch. Pharmacal Res.* 1992, *15,* 365; *Chem. Abstr.* 1993, *119,* 156313 r); aerial parts afforded diosmetin-7-O-glucoside, lonicerin and vogeloside (*Saengyak Hakhoechi* 1994, *25,* 24; *Chem. Abstr.* 1994, *121,* 104073 j); two new triterpenoid saponins - loniceroside A and loniceroside B - isolated from aerial parts and characterised as 3-O-α-L-arabinosylhederagenin-28-O-α-L-rhamnosyl(1→2)[β-D-xylosyl(1→6)]-β-D-glucopyranosyl ester and 3-O-α-L-rhamnosyl(1→2)-α-L-arabinosylhederagenin-28-O-α-L-rhamnosyl(1→2)[β-D-xylosyl(1→6)]-β-D-glucopyranosyl ester respectively (*Phytochemistry* 1994, *35,* 1005).

NEW COMPOUNDS



Loniceroside A
R = Ara, R' = Glu[(2→1)Rha](6→1)Xyl
Loniceroside B
R = Ara(2→1)Rha, R' = Glu[(2→1)Rha](6→1)Xyl

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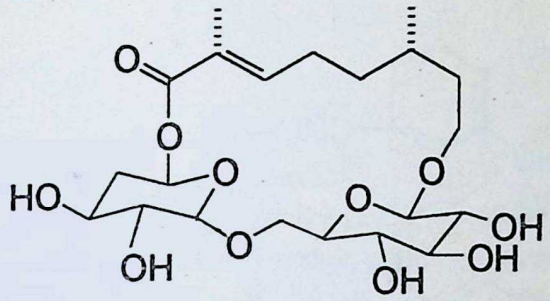
L. nitida E.H. Wilson

Eng. - Honeysuckle.

Lonitoside isolated and its structure elucidated as 6(S)8-[β-L-arabinosyl(1"→6')-β-D-glucopyranosyloxy]-2,6-dimethyloct-2E-eno-1,4"-lactone (*J. Chem. Soc.* Perkin 1 1991, 1539).

Distribution: Native of China, introduced into Indian gardens.

NEW COMPOUNDS



Lonitoside

LORANTHUS (Loranthaceae)

L. longiflorus Desr.; see *Dendrophthoe falcata* (L.f.) Etting.

LOROPETALUM (Celastraceae)

L. chinensis (R.Br.) Oliv.

Isolation of prostratin B, rugosin D and rugosin E from leaves (*Chem. Pharm. Bull.* 1990, *38*, 3296; *Phytochemistry* 1993, *32*, 1287); three new oligomeric hydrolysable tannins - loropetalin A, loropetalin B and loropetalin C - isolated and their structures determined; camelliin B and rugosin G also isolated (*Phytochemistry* 1993, *32*, 1287).

Distribution: Meghalaya, alt. 1000-1800 m.

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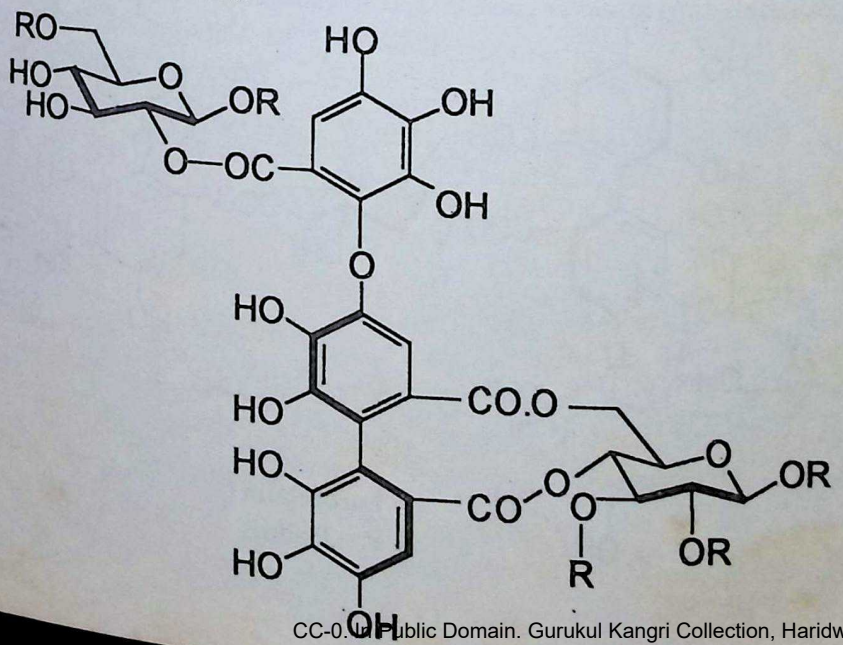

Loropetalin A
R = Galloyl

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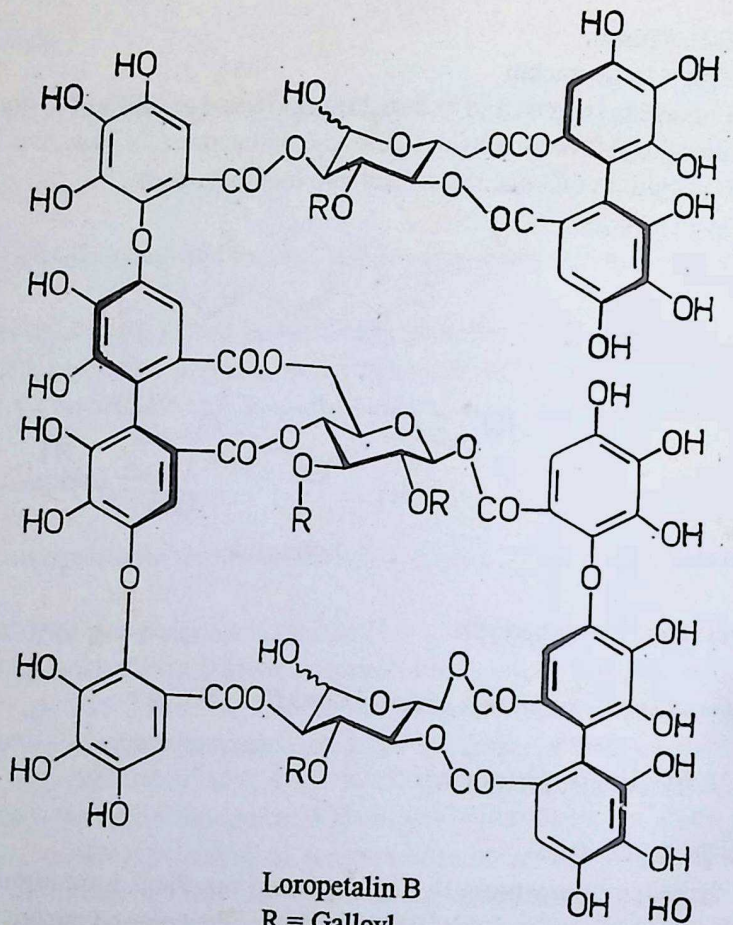
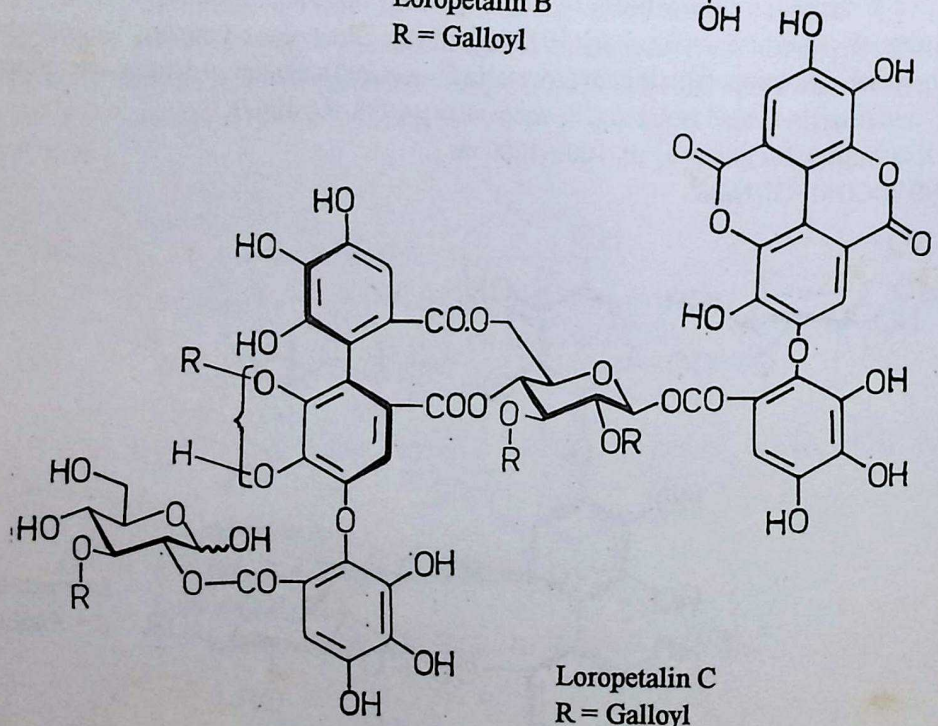


Loropetalin B
R = Galloyl



Loropetalin C
R = Galloyl

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LUCULIA (Rubiaceae)

L. pinceana Hook.

Isolation of p-hydroxyacetophenone and 2,4-dihydroxyacetophenone from leaves (*Indian J. Chem.* 1992, *31*B, 133).

Distribution: Meghalaya, alt. 1000-1500 m.

LUDWIGIA (Onagraceae)

L. adscendens (L.) Hara syn. *Jussiaea repens* L.

B. - Kesara-dam ; Bihar - Dhabni, Kesariba.

Ursolic acid isolated (*J. Indian Chem. Soc.* 1991, *68,* 634).

Distribution: Throughout India in plains, in marshes, ponds and river bank.

L. peruviana (L.) Hara syn. *Jussiaea speciosa* Ridley

Determinaion of linoleic acid (71.5%) in seed oil (*J. Am. Oil Chemists Soc.* 1994, *71,* 915; *Chem. Abstr.* 1994, *121,* 163820 y).

Distribution: Kerala and Tamil Nadu.

LUFFA (Cucurbitaceae)

L. acutangula (L.) Roxb.; see *L. acutangula* (L.) Roxb. var. *amara* (Roxb.) Clarke

L. acutangula (L.) Roxb. var. *amara* (Roxb.) Clarke syn. *L. acutangula* (L.) Roxb., *L. amara* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 442).

Isolation and structure elucidation of seven new oleanane-type triterpene saponins - acutosides A, B, C, D, E, F and G - from herb (*Chem. Pharm. Bull.* 1991, *39,* 599); another two heptaglycosides - acutoside H and acutoside I - isolated from seeds and their structures determined (*Chem. Pharm. Bull.* 1991, *39,* 889).

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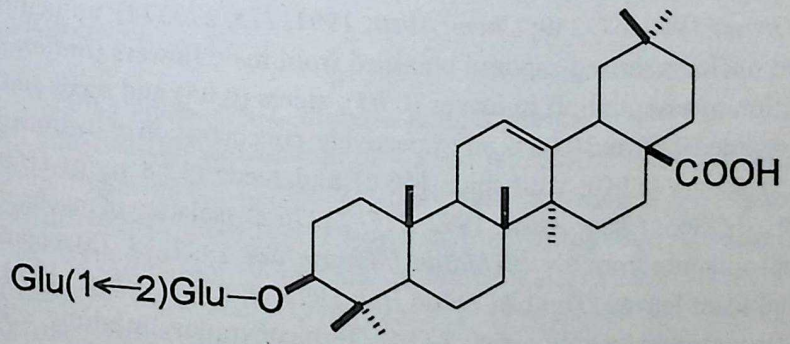

Acutoside A

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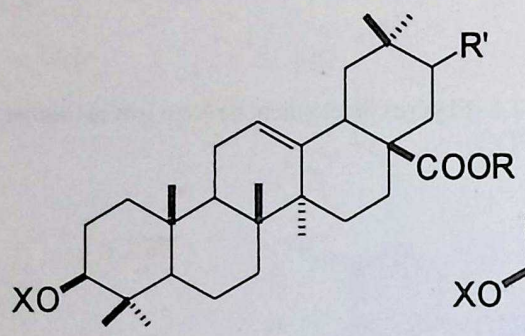

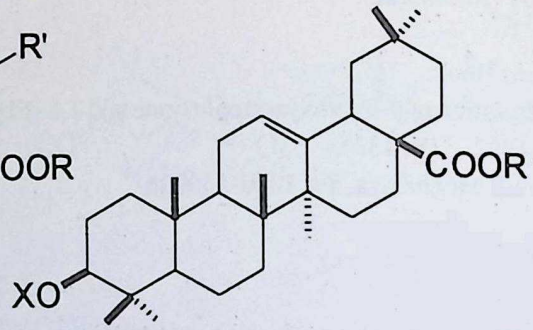

X = Glu(2→1)Glu
Acutoside B
R = Ara(2→1)Rha((4→1)Xyl, R' = H
Acutoside C
R = Ara(2→1)Rha(4→1)Xyl, R' = OH
Acutoside D
R = Ara(2→1)Rha(4→1)Xyl(3→1)Xyl, R' = H
Acutoside E
R = Ara(2→1)Rha(4→1)Xyl(3→1)Ara, R' = H
Acutoside F
R = Ara(2→1)Rha[(3→1)Xyl](4→1)Xyl, R' = H
Acutoside G
R = Ara(2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Ara, R' = H

X = Gluc.acid(3→1)Ara
Acutoside H
R = Ara(2→1)Rha[(3→1)Xyl(4→1)Xyl](3→1)Xyl
Acutoside I
R = Ara(2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Ara

L. aegyptiaca Mill. ex Hook.f.; see *L. cylindrica* (L.) M. Roem.

L. amara Roxb.; see *L. acutangula* (L.) Roxb. var. *amara* (Roxb.) Clarke

L. cylindrica (L.) M. Roem. syn. *L. aegyptiaca* Mill. ex Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 442).

Palmitic, stearic, oleic and linoleic acids identified in seed oil (35.5%) by GC-MS (*Riv. Ital. Sostanze Grasse* 1990, *67,* 259; *Chem. Abstr.* 1991, *115,* 27937 r); apigenin, oleanolic acid, β-sitosterol and uncharacterised saponin obtained from male flowers (*Indian Drugs* 1990, *28,* 35); determination of essential oil in leaves (0.05), stems (0.05) and seeds (0.08%); fruit juice and fruit sap contained 0.06 and 0.03% oil respectively; concentration of hydrocarbons determined in leaves (75.5), stems (52.0), fruit juice (46.6) and seeds (32.8 μg/g) (*Han'guk Nanghwa Hakhoechi* 1991, *34,* 366; *Chem. Abstr.* 1992, *117,* 23296 z); isolation of machaerinic acid lactone as its acetate and apigenin from leaves (*Indian J. Pharm. Sci.* 1992, *54,* 75); oleanolic acid bearing saponin isolated from leaves (*Tap Chi Duoc Hoc* 1993, 9; *Chem. Abstr.* 1994, *121,* 42511 q); isolation of 21β-hydroxyoleanolic acid, 3-O-β-D-glucopyranosylmaslinic acid and 3-O-β-D-

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glucosyl-2α-hydroxygypsogenin from leaves (*Huaxi Yaoxue Zazhi* 1993, *8,* 63; *Chem. Abstr.* 1994, *121,* 175208 t); isolation and structure elucidation of lucyin A and lucyoside N from leaves (*Yaoxue Xuebao* 1993, *28,* 836; *Chem. Abstr.* 1994, *120,* 101999 j); lucyosides C, E, F and H isolated from fruits along with mixture of α-spinasterol and stigmasta-7,22,25-trien-3β-ol and mixture of their glucosides (*Zhongguo Zhongyao Zazhi* 1994, *19,* 233; *Chem. Abstr.* 1994, *121,* 129923 z).

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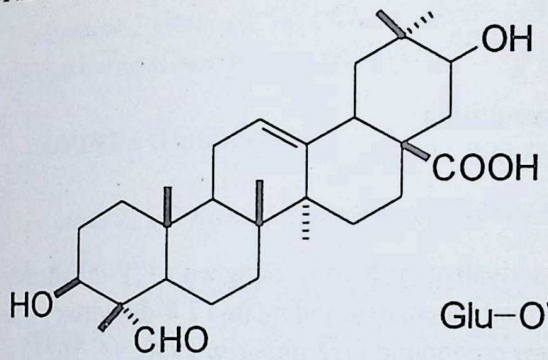
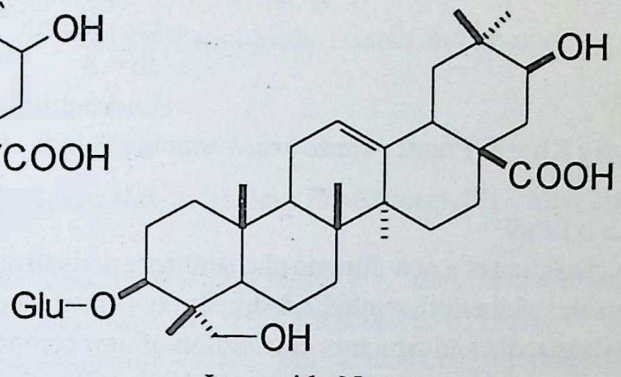


Lucyin A



Lucyoside N

BIOLOGICAL ACTIVITY

Anti-allergic activity of bryonolic acid compared with that of glycyrrhetinic acid in rats. Bryonolic acid (0.6 mg/kg, i.p.) inhibited homologous passive cutaneous anaphylaxis more strongly than glycyrrhetinic acid at the same dose. It significantly inhibited delayed hypersensitivity in mice unlike glycyrrhetinic acid (*Planta Med.* 1991, *57,* 527); oleanolic acid reduced *in vitro* immunohaemolysis of antibody-coated sheep erythrocytes by guinea pig serum by inhibiting C3-convertase of classical complement pathway; threshold concentration of oleanolic acid required for inhibition of C3-convertase was 100.0 μg/ml (*J. Pharm. Pharmacol.* 1994, *46,* 922).

L. echinata Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 443).

Isolation of datiscacin, curcurbitacin B, its 2-O-glucoside and cucurbitacin S-2-O-β-D-glucoside from fruits (*Phytochemistry* 1994, *36,* 421).

LUISIA (Orchidaceae)

L. brachystachys (Lindl.) Blume syn. *L. indivisa* King & Prantl.

Isolation and structure elucidation of 4,3'-dihydroxy-3,5'-dimethoxydibenzyl, methyl 2,4-dihydroxy-6-methylbenzoate, methyl 2,4-dihydroxy-3,6-dimethylbenzoate; β-sitosterol, betulinic acid, p-hydroxybenzaldehyde and p-hydroxyphenylpropionic acid also isolated (*Indian J. Chem.* 1989, *28*B, 771); two new stilbenoids - lusianthrin and lusianthridin - isolated and their structures established (*Phytochemistry* 1990, *29,* 621).

Distribution: Himalayas, from Garhwal to Kumaon and Khasi Hills, ascending to 1500 m.

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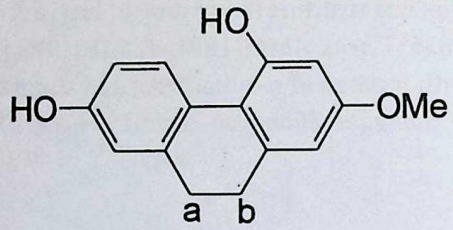
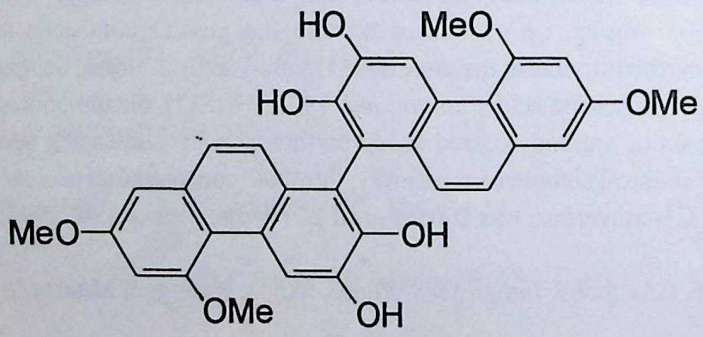


Lusianthrin
ab = Δ
Lusianthridin

L. indivisa King & Prantl.; see *L. brachystachys* (Lindl.) Blume

L. volucris Lindl.

Isolation of a new dimeric phenanthrene derivative - volucrin - along with 3',4'-dihydroxy-3,5'-dimethoxybibenzyl, methyl 2,4-dihydroxy-6-methylbenzoate and methyl 2,4-dihydroxy-3,6-dimethylbenzoate and structure elucidation of new compound (*Tetrahedron* 1990, *46,* 3621).
Distribution: Sikkim and Meghalaya, alt. 1300-1600 m.
NEW COMPOUNDS



Volucrin

LUMNITZERA (Combretaceae)

L. racemosa Willd. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 397).
BIOLOGICAL ACTIVITY

Neochebulinic acid, 2,3-di-O-galloyl-D-glucopyranose, 1,2,3,6-tetra-O-galloyl-D-glucopyranose, 2,3,4,6-tetra-O-galloyl-D-glucopyranose, 1,2,3,4,6-penta-O-galloyl-β-D-glucopyranose, 2,3-(S)-HHDP-D-glucose, punicalagin, chebulagic acid, corilagin, castalagin, and chebulinic acid investigated for antihypertensive activity. Only the last three compounds

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lowered blood pressure of SHR rats, with different onset times, and also normotensive rats (*J. Nat. Prod.* 1993, *56*, 629).

LUNATHYRIUM (Anthyriaceae)

L. japonicum (Thunb.) Kurata syn. *Diplazium japonicum* (Thunb.) Bedd., *D. decussatum* Bedd.

Quercetin-3-O-rutinoside, vicenin 2, kaempferol glycosides and vitexin isolated (*Pertanika* 1991, *14*, 293; *Chem. Abstr.* 1993, *118*, 187786 f).

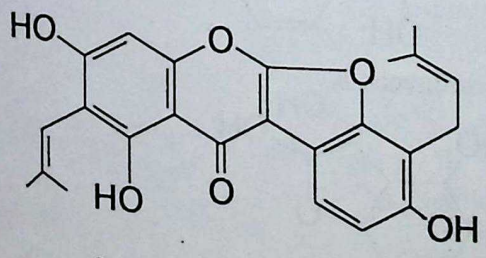
Distribution: North-western Himalayas, Kerala, Tamil Nadu, Assam and Manipur.

LUPINUS (Papilionaceae)

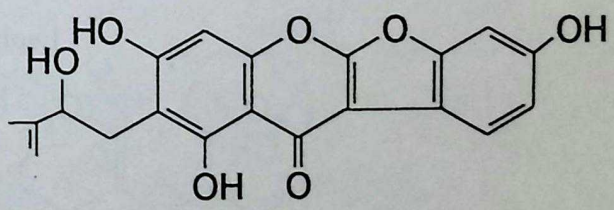
L. albus L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 443).

Isolation of new coumaronochromone - lupinalbin F - and thirteen isoflavones - lupinisoflavones G, H, I and J; lupinisolones A, B and C; lupinisols A, B and C; isoderrone, isochandalone and 2'-hydroxyisolupalbigenin - from roots and their structure elucidation; chandalone, angustone B and angustone C also isolated (*Phytochemistry* 1989, *28*, 901); isolation and structure determination of a new coumaronochromone - lupinalbin G ; new pyranoisoflavones - lupinisoflavone K, lupinisoflavone L and allolicoisoflavone B (sophoraisoflavone A) - and new dihydrofuranoisoflavones - lupinisoflavone M and lupisoflavone N - from roots (*Z. Naturforsch.* 1990, *45*C, 147; *Chem. Abstr.* 1990, *113*, 94778 m); new isoflavone glucosides - 2'-hydroxygenistein-7-O-β-D-glucoside, 2'-hydroxygenistein-4'-O-β-D-glucoside, luteone-7-O-β-D-glucoside, licoisoflavone A-7-O-β-glucoside, licoisoflavone A-4'-O-β-glucoside and 2'-hydroxygenistein-7-O-β-(6''-O-malonyl)glucoside - isolated and their structures established; 7-O-β-glucoside, 4'-O-β-glucoside and 7-O-β-(6''-O-malonyl)glucoside of genistein also isolated (*Z. Naturforsch.* 1991, *46*C, 513; *Chem. Abstr.* 1991, *115*, 252101 h); a trypsin inhibitor containing serine, glutamic acid, arginine and proline isolated from seeds (*Dokl. Akad. Nauk USSR* 1991, *35*, 1039; *Chem. Abstr.* 1992, *116*, 124883 y); new coumaronochroman-4-ones - lupinols A, B and C - isolated (*Z. Naturforsch.* 1991, *46*C, 331; *Chem. Abstr.* 1991, *115*, 131974 m); (+)angustifoline (0.0096%) isolated from seeds (*Planta Med.* 1993, *59*, 289).

NEW COMPOUNDS



Lupinalbin F



Lupinalbin G

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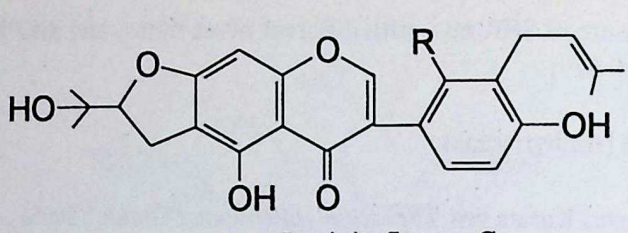
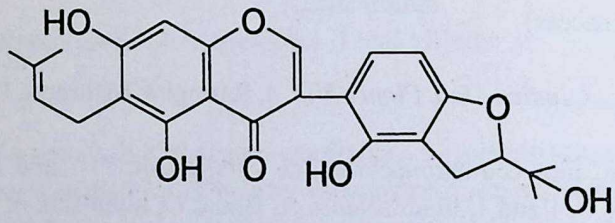
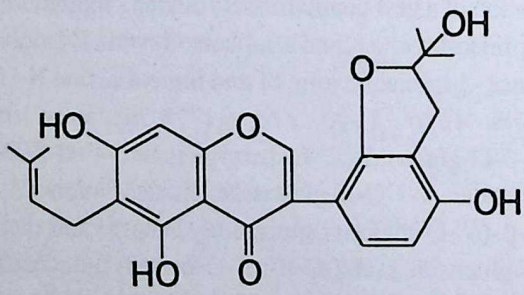


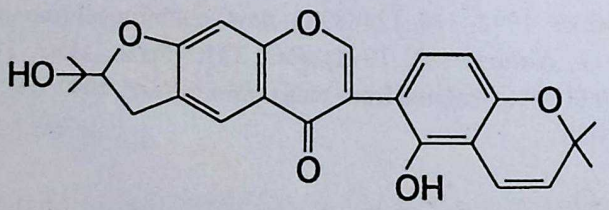
Lupinisoflavone G
R = H
Lupinisoflavone H
R = OH



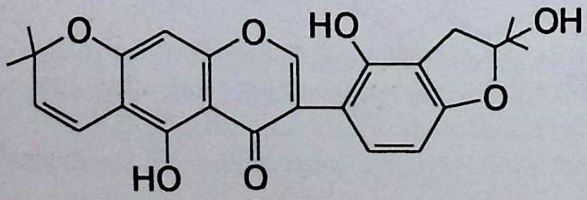
Lupinisoflavone I



Lupinisoflavone J



Lupinisoflavone K



Lupinisoflavone L

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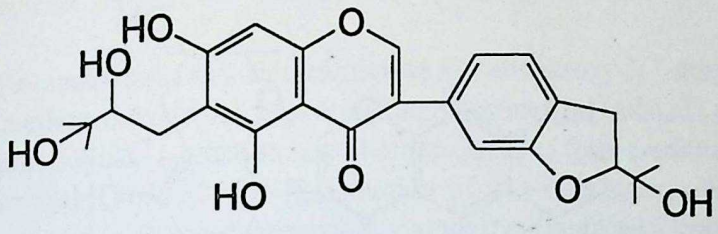
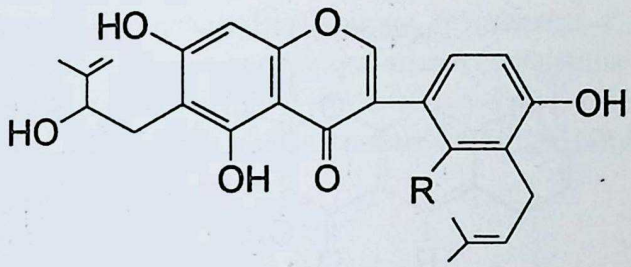
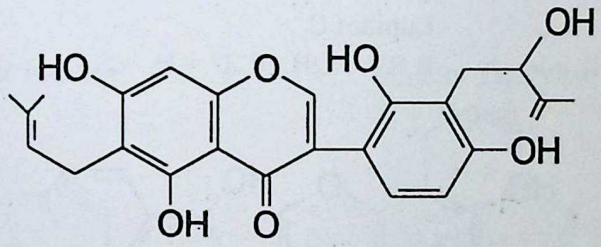


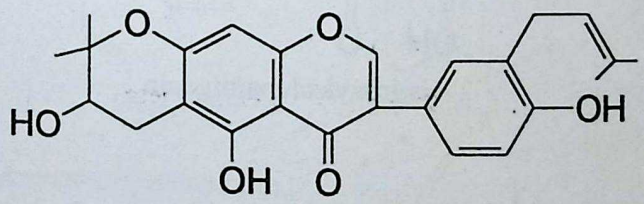
Lupinisoflavone M



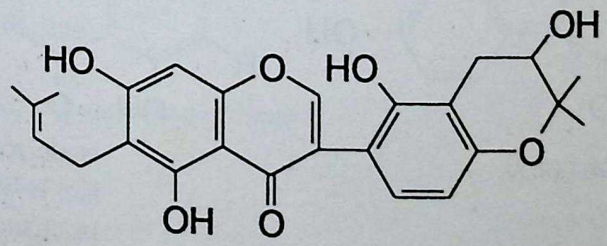
Lupinisol A
R = H
Lupinisol B
R = OH



Lupinisol C



Lupinisolone A



Lupinisolone B

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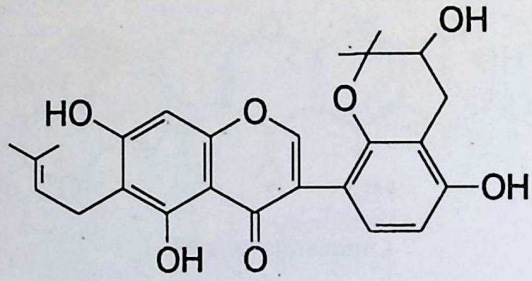
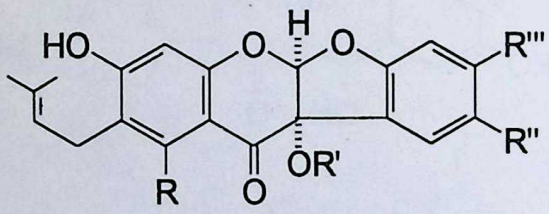
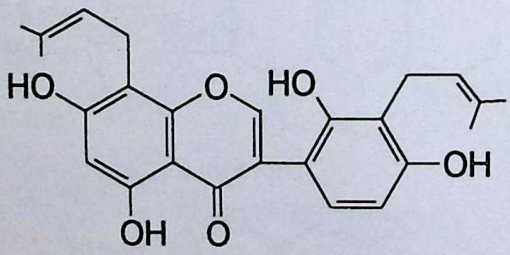


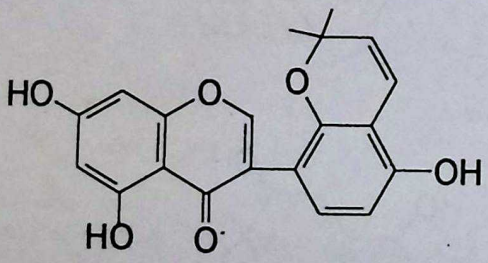
Lupinisolone C



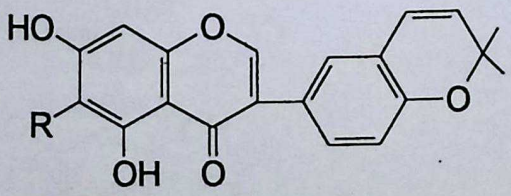
Lupinol A
R,R' = H, R'' = OH, R''' = $CH_2CH{=}CMe_2$
Lupinol B
R = H, R' = Me, R'' = OH, R''' = $CH_2CH{=}CMe_2$
Lupinol C
R,R''' = OH, R',R'' = H



2'-Hydroxyisolupalbigenin



Allolicoisoflavone B



Isoderrone
R = H
Isochandalone
R = $CH_2CH{=}CMe_2$

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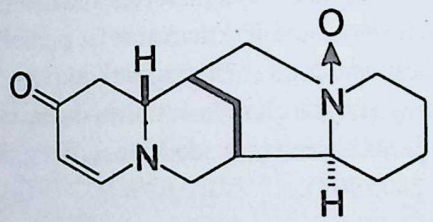
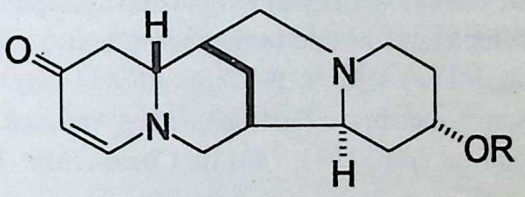
L. hirsutus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 445).

A new isoflavone isolated and characterised as 2',4'-dihydroxy-5,7-dimethoxyisoflavone; 5-hydroxy-3,6,7-trimethoxyflavone and 5,7,8-trimethoxyflavone also isolated (*J. Nat. Prod.* 1990, *53,* 1340); a new lupin alkaloid - (–)multiflorine N-oxide - isolated from seedlings and its structure elucidated (*Heterocycles* 1991, *32,* 1167); isolation of two new lupin alkaloids - (–)13α-tigloyloxymultiflorine and (+)(trans-4'-acetoxy-cinnamoyl) epilupinine - from 7 to 10 days old seedlings together with (–) multiflorine, (–)5-dehydromultiflorine, (+)epilupinine, its N-oxide, (+)(trans-4'-hydroxy-3'-methoxycinnamoyl)epilupinine, (+)(trans/cis-4'-hydroxy-cinnamoyl)-epilupinine and (–) (trans/cis-4α-L-rhamnosyloxycinnamoyl)epilupinine (*J. Nat. Prod.* 1991, *54,* 477); a new glycosidic lupin alkaloid - (–)(3'-methoxy-4'-α-L-rhamnosyloxycinnamoyl) epilupinine (I) - isolated from aerial parts and its structure established (*Phytochemistry* 1994, *37,* 591).

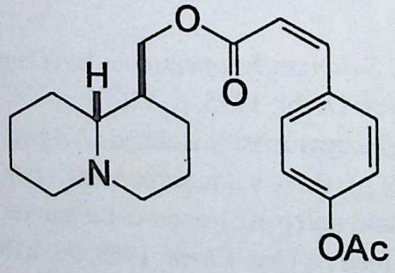
NEW COMPOUNDS



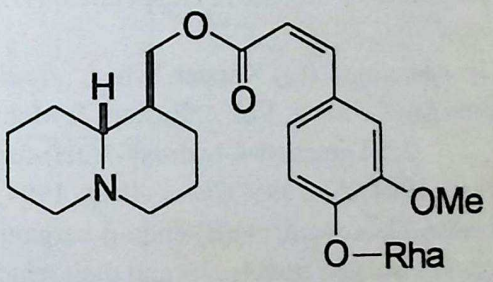
(-)Multiflorine N-oxide



(-) 13α-Tigloyloxymultiflorine
R = Tigloyl



(+)(Trans-4'-acetoxycinnamoyl)epilupinine



I

LYCHNIS (Caryophyllaceae)

L. githago (L.) Scop.; see *Agrostemma githago* L.

LYCIANTHES (Solanaceae)

L. biflora (Lour.) Bitt. ssp. *biflora* syn. *Solanum biflorum* Lour.

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Neogitogenin (0.009%) isolated (*Pharmazie* 1990, *45*, 381; *Chem. Abstr.* 1990, *113*, 118019 s).

Distribution: Nepal to Nagaland and Tripura.

LYCIUM (Solanaceae)

L. barbarum L. (*barbarium*) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 445).

A polysaccharide isolated (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1990, *4*, 39; *Chem. Abstr.* 1990, *112*, 229435 z); proline as major amino acid identified along with taurine and γ-aminobutyric acid in free amino acids (2.67%) obtained from fruits (*Zhongguo Yaoke Daxue Xuebao* 1991, *22*, 53; *Chem. Abstr.* 1991, *115*, 15369 u).

BIOLOGICAL ACTIVITY

Administration of polysaccharide augmented murine spleen T lymphocytes and natural killer cell cytotoxicity in normal and cyclophosphamide-treated mice. Furthermore, it partially or completely reversed immunosuppressive effect of cyclophosphamide (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1990, *4*, 39; *Chem. Abstr.* 1990, *112*, 229435 z); polysaccharide inhibited damaging action on membrane electrophysiology induced by radical peroxidation in toadoocytes (*Zhongguo Zhongyao Zazhi* 1993, *18*, 110; *Chem. Abstr.* 1993, *118*, 247596 f).

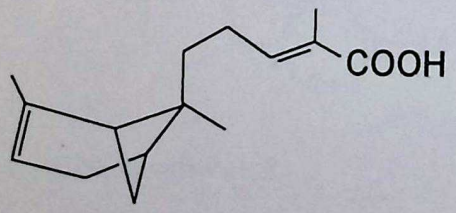
LYCOPERSICON (LYCOPERSICUM) (Solanaceae)

L. esculentum Mill.; see *L. lycopersicum* (L.) Karsten

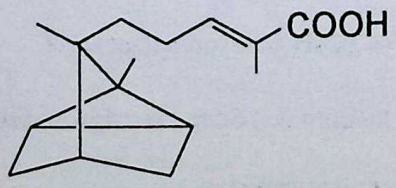
L. lycopersicum (L.) Karsten syn. *L. esculentum* Mill., *Solanum lycopersicum* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 446).

2,5-Dimethyl-4-hydroxy-3(2H)-furanone-β-D-glucopyranoside isolated (*J. Agric. Food Chem.* 1994, *42*, 1595; *Chem. Abstr.* 1994, *121*, 104129 g); three sesquiterpenoids - (+)(E)-α-santalen-12-oic acid, (+)(E)-endo-β-bergamoten-12-oic acid and (–)(E)-endo-α-bergamoten-12-oic acid - isolated from leaves and their structures determined (*J. Org. Chem.* 1988, *53*, 2186); α- and β-forms of (E)-endo bergamoten-12-oic acid synthesised (*Synthesis* 1994, 417).

NEW COMPOUNDS



(-)(E)-Endo-α -bergamoten-12-oic acid



(+)(E)α-Santalen-12-oic acid

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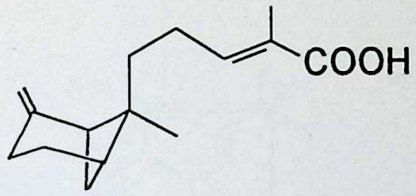


(+)(E)-Endo-β-bergamoten-12-oic acid

BIOLOGICAL ACTIVITY

(+)(E)-α-Santalen-12-oic acid and (+)(E)endo-β-bergamoten-12-oic acid stimulate oviposition behaviour of female gravid moth *Heleiothis zea*; activity of latter was about twice that of former (*J. Org. Chem.* 1988, *53*, 2186).

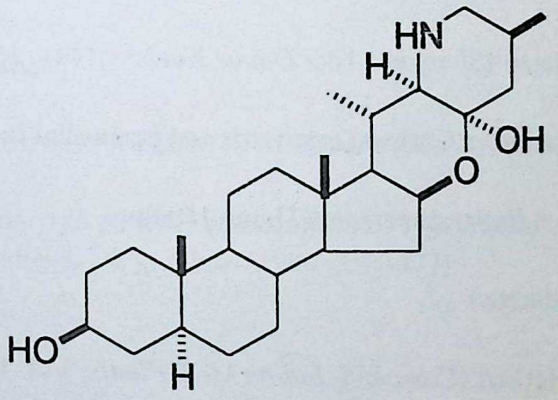
L. pimpinellifolium (Juslen.) Mill.

Eng. - Currant tomato.

Two new alkaloids - pimpifolidine and 22-isopimpifolidine - isolated and characterised as 22,26-epimino-16β,23-epoxy-5α,22αH,25αH-cholestane-3β,23α-diol and its 22βH-isomer respectively; tomatidine and soladulcidine also isolated (*Phytochemistry* 1994, *35*, 813).

Distribution: Native of Peru and Ecuador, introduced into India from U.K.

NEW COMPOUNDS



Pimpifolidine

LYCOPODIASTRUM (Lycopodiaceae)

L. casuarinoides (Spring) Holub ex Dixit syn. *Lycopodium casuarinoides* Spring

A new alkaloid - N-demethylhuperzinine - isolated from aerial parts and its structure elucidated (*J. Nat. Prod.* 1994, *57*, 824).

Distribution: Assam, Meghalaya and Bhutan.

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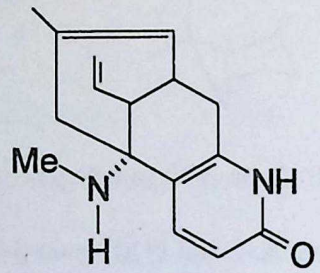
NEW COMPOUNDS



N-Demethylhuperzinine

BIOLOGICAL ACTIVITY

N-Demethylhuperzinine exhibited anticholinesterase activity (*J. Nat. Prod.* 1994, *57*, 824).

LYCOPODIUM (Lycopodiaceae)

L. casuarinoides Spring; see *Lycopodiastrum casuarinoides* (Spring) Holub ex Dixit

L. japonicum Thunb.

Physcion isolated (*Shanghai Yike Daxue Xuebao* 1991, *18*, 383; *Chem. Abstr.* 1992, *116*, 191080 x).

Distribution: Himalayas, from Garhwal eastwards and peninsular India.

L. serratum Thunb.; see *Huperzia serrata* (Thunb.) Rothm.

LYCORIS (Amaryllidaceae)

L. radiata (L'Herit.) Herbert (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 447).

Oligofructans based in 1-kestose and neokestose units identified by HPLC (*Agric. Biol. Chem.* 1990, *54*, 1291); a new alkaloid - hippeastrine N-oxide - isolated from fruits and its structure established; galanthamine, lycoramine, O-methyllycorenine, homolycorine and their N-oxides, O-demethyllycoramine, O-demethylhomolycorine, vittatine, tazettine, lycorine, haemanthidine as well as dipalmitoylphosphatidylcholine and 1-palmitoyl-2-linoleoylphosphatidylcholine also isolated (*Chem. Pharm. Bull.* 1991, *39*, 1849); lycorine synthesised (*Chem. Lett.* 1991, 1365; *Chem. Abstr.* 1991, *115*, 183638 z); synthesis of lycoramine (*J. Org. Chem.* 1992, *57*, 752).

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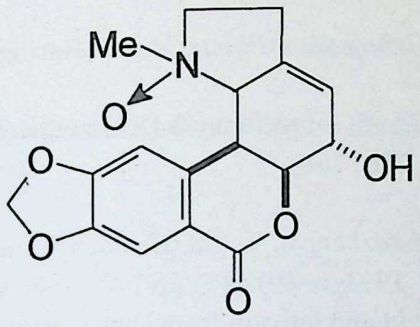
NEW COMPOUNDS



Hippeastrine N-oxide

BIOLOGICAL ACTIVITY

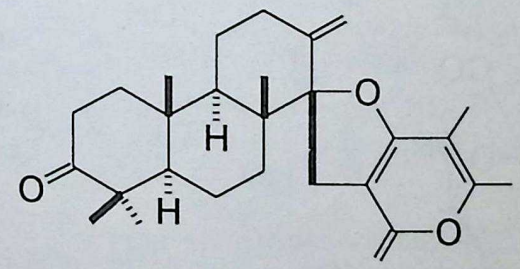
Dihydrolycorine (20.0, 40.0 and 80.0 mg/kg, i.v.) lowered mean arterial pressure in pentobarbitone-anaesthetised normotensive rats and cats and in conscious rats either normotensive or renovascular hypertensive. It depressed hypertensive effect of reaction to electrical stimulation to T 7-9 segments of spinal cord in pithed rats. It also depressed hypertensive effect of phenylephrine. In rabbit aorta ring and rat anococcygeus muscle, dihydrolycorine antagonised contractile effect of methoxamine with PA2 values of 5.93 and 6.35 respectively. Thus, it can block α1-adrenoceptors (*Zhongguo Yaoli Xuebao* 1993, *14,* 45; *Chem. Abstr.* 1993, *118,* 116452 h).

LYGODIUM (Lygodiaceae)

L. flexuosum (L.) Sw. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 447).

A new spirofuropyran perhydrophenanthrene - lygodinolide - isolated and its structure established by X-ray studies (*J. Org. Chem.* 1990, *55,* 4977).

NEW COMPOUNDS



Lygodinolide

L. japonicum (Thunb.) Sw. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 447).

Synthesis of GA73 methyl ester (*Tetrahedron Lett.* 1990, *31,* 6235).

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MACARANGA (Euphorbiaceae)

M. indica Wight (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 448).

Synthesis of 2,3-dihydro-6,7-dimethoxy-2-(3,4-methylenedioxyphenyl)-[1]-benzopyran-4-one (*Indian J. Chem.* 1989, *28*B, 268).

M. peltata Muell.-Arg. syn. *M. roxburghii* Wight (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 401).

Isolation of ellagic acid and luteolin from leaves (*Fitoterapia* 1994, *65,* 184).

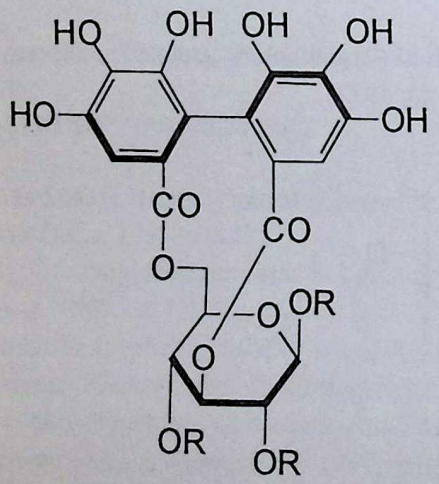
M. roxburghii Wight; see *M. peltata* Muell.-Arg.

M. tanarius (L.) Muell.-Arg. (*tanaria*)

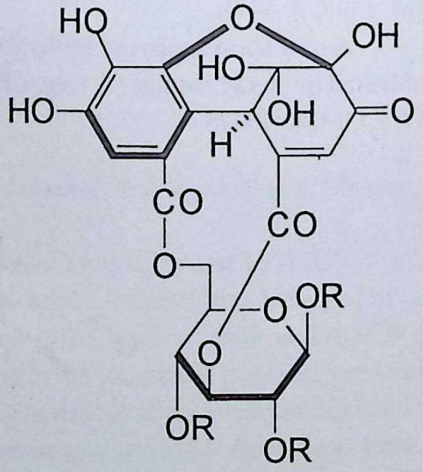
Seven new hydrolysable tannins - 1,4-di-O-galloyl- α-D-glucose and 3,4-di-O-galloyl-D-glucose, galloylpunicafolin, galloylgeraniin, 1-O-galloyl-3-O-brevifolincarboxyl-β-D-glucopyranose, macaranganin(1,2,4-tri-O-galloyl-3,6(S)-hexahydroxydiphenoyl-β-D-glucopyranose) and tanarinin (1,2,4-tri-O-galloyl-3,6-dehydrohexahydroxydiphenoyl-β-D-glucopyranose) - isolated from leaves and characterised (*Chem. Pharm. Bull.* 1990, *38,* 1218); corilagin, mallotinic acid, geraniin, macarinin A, putranjivain A, putranjivain B, mallotunin, mallophilinin, repandusinic acid A and phyllanthusiin C isolated from bark (*Yaowu Shipin Fenxi* 1993, *1,* 273; *Chem. Abstr.* 1994, *121,* 5052 v).

Distribution: Andaman Islands.

NEW COMPOUNDS



Macaranganin
R = Galloyl



Tanarinin
R = Galloyl

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MACHILUS (Lauraceae)

M. bombycina King & Hook.f.; see *Persea bombycina* (King ex Hook.f.) Kostermans

M. sericea (Nees) Blume; see *Persea bombycina* (King ex Hook.f.) Kostermans

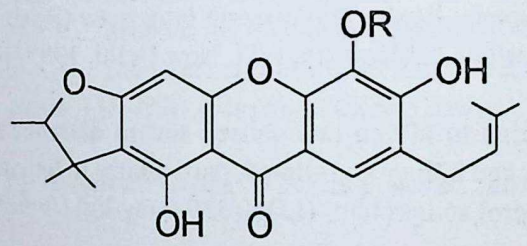
MACLURA (Urticaceae)

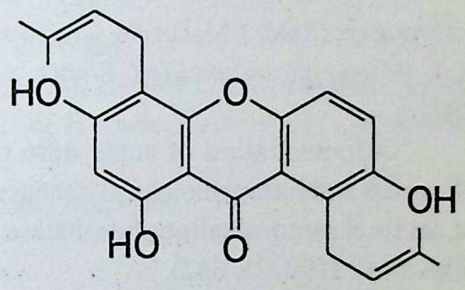
M. aurantiaca Nutt.; see *M. pomifera* (Rafin.) C.K. Schum.

M. cochinchinensis (Lour.) Corner syn. *Cudrania javanensis* Hook.f., p.p., *C. cochinchinensis* (Lour.) Kudo & Masam. ex Sauer. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 448).

Four new prenylated xanthones - geronoxanthones E, G, H and I - isolated from bark along with cudraniaxanthone and their structures elucidated (*Phytochemistry* 1989, *28,* 2823).

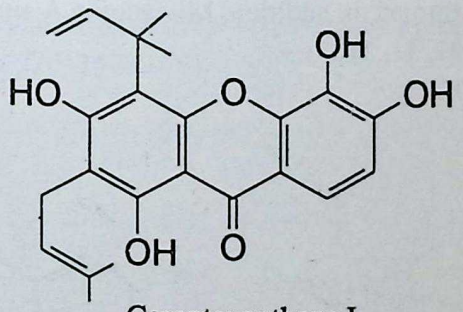
NEW COMPOUNDS





Gerontoxanthone E
R = Me
Gerontoxanthone G
R = H

Gerontoxanthone H



Gerontoxanthone I

M. pomifera (Rafin.) C.K. Schum. syn. *M. aurantiaca* Nutt. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 449).

The polar lipid fraction showed antitumor activity in mice; combination of small doses of lipids, cyclophosphamide and furosemide prolonged the lifespan of mice bearing Ehrlich tumor by 100%, sarcoma by 130%, melanoma by 90% and leukaemia by 100% (*Khim.-Farm. Zh.* 1993, *27,* 21; *Chem. Abstr.* 1994, *120,* 95064 g).

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Heptacosane, octacosane and nonacosane comprised 92.3% of bark hydrocarbons; major fatty acids of saponifiable lipids were palmitic, oleic and linolenic acids; tovoxanthone, macluraxanthone, alvaxanthone, 6-deoxyjacareubin and lupeol isolated from bark (*Khim. Prir. Soedin.* 1989, 720; *Chem. Abstr.* 1990, *112,* 73888 m); phospholipids in lipid fraction consisted of phosphatidylcholine (48.0), phosphatidylinositol (24.1) and phosphatidylethanolamine (17.6%); fatty acids consisted of palmitic, oleic and linoleic acids (*Khim.-Farm. Zh.* 1993, *27,* 21; *Chem. Abstr.* 1994, *120,* 95064 g).

MACROTOMIA (Boraginaceae)

M. euchroma (Royle) Paulsen; see *Arnebia euchroma* (Royle) Johnston

M. perennis (Schrenk) Boiss.; see *Arnebia euchroma* (Royle) Johnston

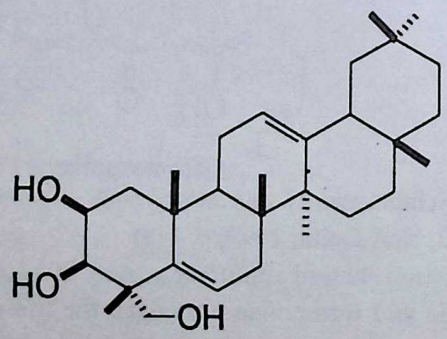
MADHUCA (Sapotaceae)

M. butyracea (Roxb.) Macbride syn. *Bassia butyracea* Roxb., *Diploknema butyracea* (Roxb.) Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 450).

Administration of acute dose of saponins to albino rats caused severe diarrhoea, restlessness and histopathological changes in liver and kidney and altered, particularly in female rats, levels of serum alkaline phosphatase, cholesterol and proteins (LD50 330.0 mg/kg) (*Indian J. Exp. Biol.* 1990, *28,* 642).

Seed cake contained saponins (10.4%) (*Indian J. Exp. Biol.* 1990, *28,* 642); a new triterpenoidal sapogenin - butyraceol - isolated from seeds and characterised (*Phytochemistry* 1991, *30,* 2087); new triterpenoidal saponins - butyrosides A and B - isolated from seeds and their structures determined; in addition, Mi-saponin A and 16α-hydroxy Mi-saponin A isolated (*Phytochemistry* 1992, *31,* 3169).

NEW COMPOUNDS



Butyraceol

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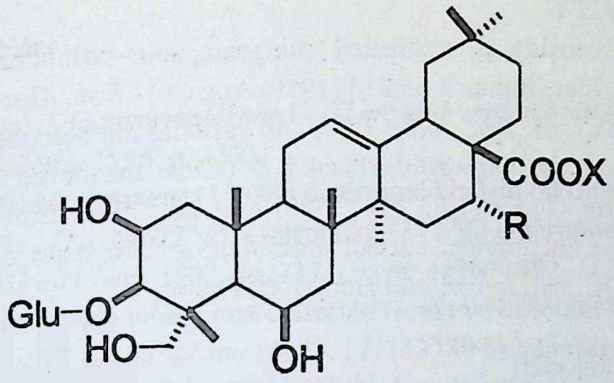


X = Ara(2→1)Rha(4→1)Xyl(3→1)Apiofuranose
Butyroside A
R = H
Butyroside B
R = OH

M. latifolia (Roxb.) Macbride syn. *M. longifolia* (Koen.) Macbride (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 450).

Seed kernel oil caused temporary sterlity in male rats.

Seed kernel oil (45.0%) consisted of oleic (42.0), linoleic (24.0), palmitic (19.0) and stearic (15.0%) acids (*Food Chem. Toxicol.* 1990, *28,* 601; *Chem. Abstr.* 1991, *114,* 60607 k).

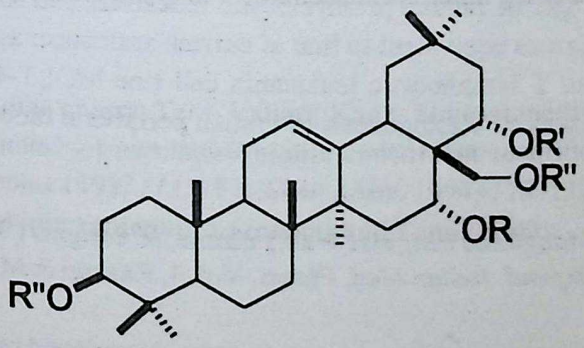
M. longifolia (Koen.) Macbride; see *M. latifolia* (Roxb.) Macbride

MAESA (Myrsinaceae)

M. indica (Roxb.) DC. var. *angustifolia* Hook.f. & Thoms. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 451).

A triterpene glycoside (I) isolated from leaves and its structure proposed (Indian 1,65,214 (1989) Aug. 26; *Chem. Abstr.* 1992, *116,* 158896 v).

NEW COMPOUNDS



I

R/R' = Ac/Tigloyl, R" = Sugar moiety

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BIOLOGICAL ACTIVITY

Triterpene glycoside (I) exhibited analgesic, anti-inflammatory, antipyretic and transquilosedative activities (Indian 1,65,214 (1989) Aug. 26; *Chem. Abstr.* 1992, *116*, 158896v).

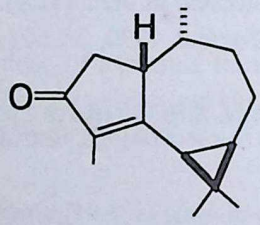
Note : In Hook.f. *Fl. Brit. India* 3:509, no varieties are described under *Maesa chisia* Ham. ex D.Don, however, var. *angustifolia* Hook.f. & Thoms. mentioned under *M. indica* (Roxb.) DC. It appears that in ref. (Indian 1,65,214 (1989) Aug. 26; *Chem. Abstr.* 1992, *116*, 158896 x) cited above, authors have not provided correct name of the species. It has, therefore, been corrected as *M. indica* (Roxb.) DC. var. *agustifolia* Hook.f. & Thoms.

MAGNOLIA (Magnoliaceae)

M. grandiflora L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 452).

A new sesquiterpene ketone - cyclocolorenone - isolated (*J. Agric. Food Chem.* 1991, *39*, 1166; *Chem. Abstr.* 1991, *115*, 5132 x); 6-methoxy-7-hydroxycoumarin and 6,8-dimethoxy-7-hydroxycoumarin, 11,13-dehydrocompressanolide, magnograndiolide and parthenolide isolated from leaves (*Planta Med.* 1994, *60*, 390).

NEW COMPOUNDS



Cyclocolorenone

BIOLOGICAL ACTIVITY

Cyclocolorenone markedly inhibited growth in etiolated wheat coleoptile assay. It was phytotoxic to greenhouse-grown corn, bean and tobacco plants and showed antimicrobial activity (*J. Agric. Food Chem.* 1991, *39*, 1166; *Chem. Abstr.* 1991, *115*, 5132 x); honokiol exhibited antileukaemic activity against human promyelocytic leukaemic cell line HL-60 with IC50 less than 100.0 ng/ml which was equivalent to that of current anticancer agents. Honokiol was also effective against human T lymphocytic leukaemia cell line MOLT-4. It showed little or no inhibition of mitogen-induced blastogenesis of human peripheral blood lymphocytes (*Life Sci.* 1994, *55*, 1061).

M. insignis Wall. syn. *Manglietia insignis* (Wall.) Blume, *M. insignis* (Wall.) Blume var. *latifolia* Hook.f. & Thoms. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 453).

Magnocurarine (2.09) and salicifoline (0.39%) determined by HPLC in bark and root cortex of plant grown in Yunnan, China (*Fitoterapia* 1990, *61*, 245).

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MAJORANA (Lamiaceae)

M. hortensis Moench syn. *Origanum majorana* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 453).

Eugenol (26.0) and p-cymene (14.0%) determined in leaf oil (*Indian Perfum.* 1991, *35,* 102; *Chem. Abstr.* 1991, *115,* 214622 w); 4-terpineol (37.0%) determined by GC-MS in oil of plant grown in Greece (*Food Chem.* 1992, *45,* 117; *Chem. Abstr.* 1992, *117,* 110399 d); carvacrol (78.27 to 79.46%) determined in oil of plant collected from two different localities of Turkey (*J. Essent. Oil Res.* 1993, *5,* 577; *Chem. Abstr.* 1994, *121,* 153280 h); plant contained tannin (6.8%) and caffeic, chlorogenic and rosmarinic acids (*Bull. Fac. Pharm.,* Cairo Univ. 1993, *31,* 237; *Chem. Abstr.* 1994, *120,* 212569 p); monoterpenes (36.10, 35.76), monoterpene alcohols and acetates (52.85, 58.99) and sesquiterpenes and oxygenated sesquiterpenes (6.59, 2.46%) determined in essential oil of aerial parts and husks respectively; sabinene, α-terpinene, γ-terpinene, cis- and trans-sabinene hydrates, terpine-4-ol, linalyl acetate and β-caryophyllene identified as main constituents (*Indian Perfum.* 1993, *37,* 81; *Chem. Abstr.* 1994, *120,* 253055 m).

MALLOTUS (Euphorbiaceae)

M. philippinensis (Lam.) Muell.-Arg. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 454).

Kamaladiol-3-acetate (3β-acetoxy-22β-hydroxyolean-18-ene) along with friedelin, isolated from stem bark and characterised (*Phytochemistry* 1993, *32,* 407).

MALPIGHIA (Malpighiaceae)

M. glabra L.

Eng. - Barbados cherry.

α-Carotene, β-carotene and β-cryptoxanthine isolated from fruits of Brazilian plant (*Dev. Food Sci.* 1992, *29,* 643; *Chem. Abstr.* 1992, *117,* 232610 m).

Distribution: Native of tropical America, introduced into Indian gardens.

M. punicifolia L.

Eng. - West Indian cherry; Tel. - Vallari; Kan. - Simeyaranelli.

3-Methyl-3-buten-1-ol as major volatile constituent identified in fruits by GC-MS (*Parfums, Cosmet., Aromes* 1993, *113,* 81; *Chem. Abstr.* 1994, *120,* 132676 f).

Distribution: Introduced into gardens of Karnataka and Tamil Nadu.

MALUS (Rosaceae)

M. baccata (L.) Borkh. syn. *Pyrus baccata* L., *Malus baccata* (L.) Borkh. var. *himalaica* (Maxim.)

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Schneid. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 455).

β-Sitosterol, its glucoside, campesterol, its glucoside and ursolic acid isolated from fruits (*Saengyak Hakhoechi* 1993, *24,* 282; *Chem. Abstr.* 1994, *120,* 265806 v).

M. baccata (L.) Borkh. var. *himalaica* (Maxim.) Schneid.; see *M. baccata* (L.) Borkh.

M. communis DC.; see *M. pumila* Mill.

M. domestica Borkh.; see *M. pumila* Mill.

M. pumila Mill: syn. *M. sylvestris* Hort. (non Mill.), *M. communis* DC., *M. domestica* Borkh., *Pyrus malus* L., p.p., *Malus sylvestris* L. var. *domestica* Borkh. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 455).

HCN (0.033%) obtained froms seeds, leaves and stalks (*Sci. Int.* 1990, *2,* 311; *Chem. Abstr.* 1992, *116,* 124847 q); a trisaccharide isolated from fruits and characterised as vomifoliol-4-O-β-D-xylopyranosido-6-O-β-D-glucosido-9-O-β-D-glucoside (*Phytochemistry* 1992, *31,* 895); limonene, car-3-ene, α-pinene, α-humulene, terpinolene, geraniol, linalool, (Z) and (E)citrals, eugenol and benzyl alcohol identified by GC-FID in flower essential oil (*J. Agric. Food Chem.* 1993, *41,* 116; *Chem. Abstr.* 1993, *118,* 45437 u); isolation of (3S,5R,6S,7E,9ξ)3-hydroxy-5,6-epoxy-β-ionyl-β-D-glucopyranoside from leaves (*Nat. Prod. Lett.* 1994, *4,* 57; *Chem. Abstr.* 1994, *121,* 129895 s).

M. sylvestris Mill.; see *M. pumila* Mill.

M. sylvestris L. var. *domestica* Borkh.; see *M. pumila* Mill.

MALVA (Malvaceae)

M. sylvestris L. syn. *M. sylvestris* L. var. *mauritiana* (DC.) Masters, *M. sylvestris* L. ssp. *mauritiana* (L.) Thell. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 455).

A mucilage, MSL-M, isolated from leaves (*Chem. Pharm. Bull.* 1989, *37,* 3029); another polysaccharide - MSL-P - from leaves, composed of rhamnose, galactose, galacturonic acid and glucuronic acid in molar ratio of 22:6:22:11; polysaccharide contained 7.7% peptide (*Carbohydr. Res.* 1990, *198,* 323; *Chem. Abstr.* 1991, *114,* 203466 b); two new flavonoid glycosides - gossypetin-3-glucosido-8-glucuronide and hypolaetin-4-methyl ether-8-glucuronide - isolated from leaves and characterised; in addition, hypolaetin-8-glucuronide and isoscutellarein-8-glucuronide also isolated (*Phytochemistry* 1991, *30,* 987) a neutral α-D-glucan isolated from

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flowers and partially characterised (*Collect. Czech. Chem. Commun.* 1992, *57,* 2400; *Chem. Abstr.* 1993, *118,* 77121 c).

BIOLOGICAL ACTIVITY

Polysaccharides MSL-M and MSL-P exhibited remarkable anti-complementary activity (*Chem. Pharm. Bull.* 1989, *37,* 3029; *Carbohydr. Res.* 1990, *198,* 323; *Chem. Abstr.* 1991, *114,* 203466 b).

M. sylvestris L. ssp. *mauritiana* (L.) Thell.; see *M. sylvestris* L.

M. sylvestris L. var. *mauritiana* (DC.) Masters; see *M. sylvestris* L.

M. verticillata L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 455).

Isolation of two novel minor polysaccharides - MVS-IIA and MVS-IIG - from seeds; MVS-IIA composed of arabinose, galactose, mannose in molar ratio of 14:28:1 and MVS-IIG composed of glucose, galactose and mannose in molar ratio of 10:1:1 (*Chem. Pharm. Bull.* 1988, *36,* 2778); another polysaccharide - MVS-IIIA - consisting of arabinose, xylose, galactose and galacturonic acid in molar ratio of 16:1:8:3, isolated from seeds (*Phytochemistry* 1989, *28,* 2609); seeds afforded another new acidic polysaccharide - MVS-IVA - containing 3.3% proteins (*Planta Med.* 1990, *56,* 73); another acidic polysaccharide -MVS-VI - from seeds found to be composed of arabinose, xylose, galactose, glucose, rhamnose and galacturonic acid in molar ratio of 30:15:20:3:2:10 (*Chem. Pharm. Bull.* 1990, *38,* 2771; ibid. 1992, *40,* 2219); previously isolated neutral polysaccharide MVS-I found to consist of arabinose, galactose and glucose in molar ratio of 3:6:7 (*Chem. Pharm. Bull.* 1991, *39,* 2630).

BIOLOGICAL ACTIVITY

Polysaccharides, MVS-I, MVS-IIIA, MVS-IVA, MVS-VI and peptidoglycan, MVS-V, exhibited significant reticuloendothelial system-potentiating activity in carbon clearance test (*Phytochemistry* 1989, *28,* 2609; *Planta Med.* 1990, *56,* 73; *Chem. Pharm. Bull.* 1990, *38,* 2771); polysaccharides MVS-I, MVS-IIA, MVS-IIIA and MVS-IVA also showed anti-complementary activity (*Planta Med.* 1990, *56,* 168); anti-complementary activity also shown by polysaccharide MVS-VI (*Chem. Pharm. Bull.* 1990, *38,* 2771; *ibid.* 1992, *40,* 2219); polysaccharide MVS-I and polysaccharide-rich fraction (MVS-V-CH) obtained from peptidoglycan, MVS-V, also exhibited remarkable hypoglycaemic action (*Planta Med.* 1990, *56,* 168).

MAMMEA (Clusiaceae)

M. americana L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 456).

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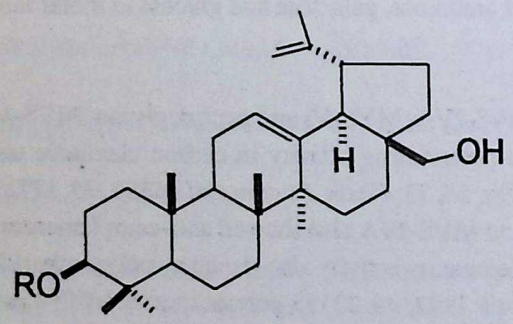
β-Ionone (22.0), 2-methylbutyric acid (12.5), (E)farnesol (4.6) and nerolidol (3.8%) determined by GC-MS as major constituents in fruit volatile oil (*J. Food Compos. Anal.* 1989, *2*, 382; *Chem. Abstr.* 1990, *113*, 76838 b).

MANGIFERA (Anacardiaceae)

M. indica L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 456).

Isolation of mangiferin from bark and leaves (*Tap Chi Duoc Hoc* 1991, *8*, 19; *Chem. Abstr.* 1992, *116*, 211134 y); amentoflavone isolated from bark (*Pakistan J. Pharm. Sci.* 1992, *5*, 155; *Chem. Abstr.* 1993, *119*, 68053 a); two new terpenoidal saponins - indicosides A and B - isolated and their structures determined (*J. Nat. Prod.* 1993, *56*, 767); a new dammaranediol (I) isolated from stem bark and characterised (*Phytochemistry* 1993, *32*, 469) flowers afforded new alkyl gallates - methyl gallate, propyl gallate, pentyl gallate, octyl gallate, 4-phenylbutyl gallate and 6-phenylhexyl gallate; in addition, dihydrogallic acid isolated (*Pakistan J. Sci. Ind. Res.* 1993, *35*, 276; *Chem. Abstr.* 1993, *118*, 230157 r); isolation of a new triterpenoid from stem bark and its characterisation as 29-hydroxymangiferonic acid (3-oxo-29-hydroxycycloart-24(E)-en-36-oic acid) (*Phytochemistry* 1994, *35*, 1301); two new cycloartane-type triterpenes - cycloartan-3β,30-diol and cycloartan-30-ol - isolated from roots and characterised (*J. Nat. Prod.* 1994, *57*, 988).

NEW COMPOUNDS

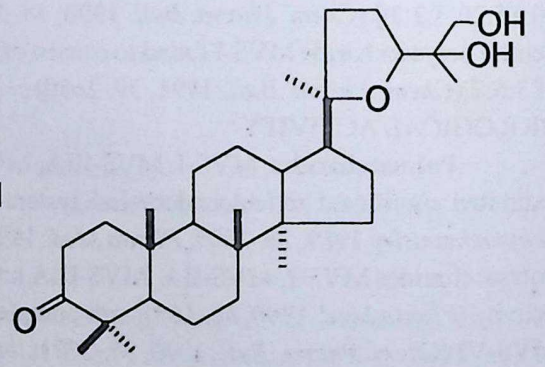


Indicoside A

R = Ara[(2→1)Glu](3→1)Glu

Indicoside B

R = Ara[(2→1)Rha(3→1)Glu](3→1)Glu



I

BIOLOGICAL ACTIVITY

Mangiferin and isomangiferin showed antiviral activity against type I Herpes simplex virus, former being more potent; their plaque reduction activity was presumably due to inhibition of virus replication within cells (*Chinese Med. J.* 1990, *103*, 160; *Chem. Abstr.* 1991, *114*, 74750 p); EC50 of mangiferin against HSV-2 plaque formation in HeLa cells was 111.7 μM and

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therapeutic index (IC50/EC50) was 8.1 (*Zhongguo Yaoli Xuebao* 1993, *14*, 452; *Chem. Abstr.* 1993, *119*, 240976 s).

M. sylvatica Roxb.

Assam - Ban-am; Nep. - Chuchi-am; Lepcha - Kathorkung.

Isolation of friedelin, friedelan-3β-ol, cycloartenol, obtusifoldienol and β-sitosterol from stem bark (*Acta Cienc. Indica, Chem.* 1991, *17*, 395; *Chem. Abstr.* 1992, *117*, 44568 e).

Distribution: Himalayas, from Nepal eastwards, alt. 300-1300 m and in Assam, Khasi Hills and Andaman Islands.

MANGLIETIA (Magnoliaceae)

M. insignis (Wall.) Blume; see *Magnolia insignis* Wall.

M. insignis (Wall.) Blume var. *latifolia* Hook.f. & Thoms.; see *Magnolia insignis* Wall.

MANIHOT (Euphorbiaceae)

M. esculenta Crantz syn. *M. utilissima* Pohl (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 409).

Plant contained hydrogen cyanide (0.037%) (*Sci. Int.* 1990, *2*, 311; *Chem. Abstr.* 1992, *116*, 124847 q).

M. utilissima Pohl; see *M. esculenta* Crantz

MANILKARA (Sapotaceae)

M. hexandra (Roxb.) Dubard syn. *Mimusops hexandra* Roxb. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 464).

Oleic (52.66), palmitic (20.86), linoleic (16.85), stearic (9.38) and myristic (0.25%) acids determined in seed oil (*J. Indian Chem. Soc.* 1989, *66*, 424); isolation of a new triterpenoid saponin from stem bark and its characterisation as 1β,2α,3α,19α-tetrahydroxyursolic acid-28-O-β-D-glucopyranoside (*Int. J. Pharmacog.* 1994, *32*, 197; *Chem. Abstr.* 1994, *121*, 251226 q).

M. littoralis (Kurz) Dubard syn. *Mimusops littoralis* Kurz (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 409).

Gallic acid, ellagic acid, methyl gallate, quercetin and polymeric tannin isolated from bark (*Indian J. Nat. Prod.* 1990, *6*(2), 16; *Chem. Abstr.* 1992, *116*, 148180 t).

M. zapota (L.) P. van Royen syn. *Achras zapota* L. (*sapota*) (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 409).

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n-Butanol extract of chicle, administered i.p. to rats suppressed PCA. It suppresed antigen-induced histamine release from rat peritoneal mast cells, thus, exhibiting antiallergenic activity (*Shokuhin Eiseigaku Zasshi* 1992, *33*, 569; *Chem. Abstr.* 1993, *119*, 7669 i).

β-Amyrin pelargonate, α-amyrin acetate, lup-20(29)-ene-3,23-diol and tritriacontane isolated from leaves (*Pakistan J. Pharm. Sci.* 1989, *2*, 33; *Chem. Abstr.* 1991, *115*, 68399 k).

MAPPIA (Icacinaceae)

M. foetida (Wt.) Miers; see *Nothapodytes nimmoniana* (Graham) Mabberley

M. oblonga Miers var *elliptica* Miers; see *Nothapodytes nimmoniana* (Graham) Mabberley

M. ovata Miers; see *Nothapodytes nimmoniana* (Graham) Mabberley

M. tomentosa Miers; see *Nothapodytes nimmoniana* (Graham) Mabberley

MARGARITARIA (Euphorbiaceae)

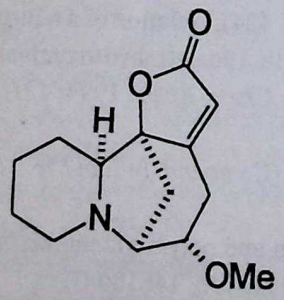
M. indica (Dalz.) Airy Shaw syn. *Phyllanthus indicus* (Dalz.) Muell.-Arg.

Assam - Gunamala, Tukora; Kan. - Hannunanne, Kali-kudai, Pan-nana.

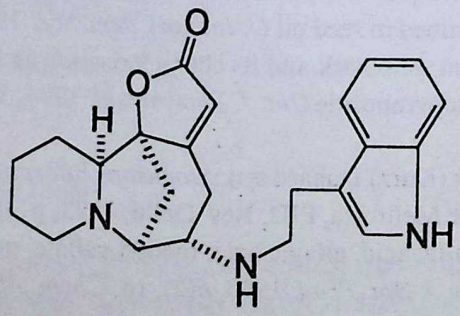
A new alkaloid - (+)15α-methoxy-14,15-dihydrophyllochrysine - isolated from bark and roots and its stereostructure and absolute configuration determined by X-ray analysis and confirmed by synthesis (*Aust. J. Chem.* 1990, *43*, 439); two new alkaloids - 4-epiphyllanthine and margaritarine - obtained from bark and their structures elucidated; NMR spectral assignment to 4β-methoxysecurinan-11-one and (2α,4α)4-methoxysecurinan-11-one; structure of securinol A revised (*J. Chem. Soc.* Perkin 1 1991, 1863).

Distribution : Kumaon Himalayas, in foothills, Assam, Orissa and in Western Ghats from Konkan southwards.

NEW COMPOUNDS



(+)15α-Methoxy-14,15-dihydrophyllochrysine



Margaritarine

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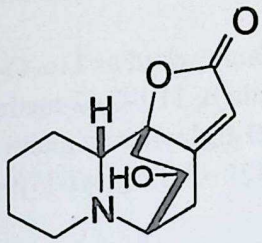
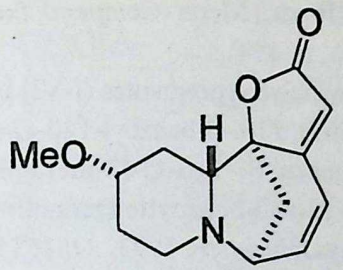


Securinol A



4-Epiphyllanthine

MARLEA (Alangiaceae)

M. begoniaefolia Roxb.; see *Alangium chinense* (Lour.) Harms

MARRUBIUM (Lamiaceae)

M. vulgare L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 410).

New lactoyl flavonoids - luteolin and apigenin-7-lactates together with their 2"-O-glucuronides and 2"-O-β-D-glucosides - isolated from leaves along with apigenin, luteolin and their 7-glucosides, apigenin-7-(6"-p-coumaroyl)glucoside, vicenin 2, vitexin and chrysoeriol (*Phytochemistry* 1989, *28,* 3201) isolation of lupeol, marrubiin, vulgarin and apigenin-7-O-glucoside (*Mansoura J. Pharm. Sci.* 1993, *9,* 92; *Chem. Abstr.* 1993, *119,* 266476 d).

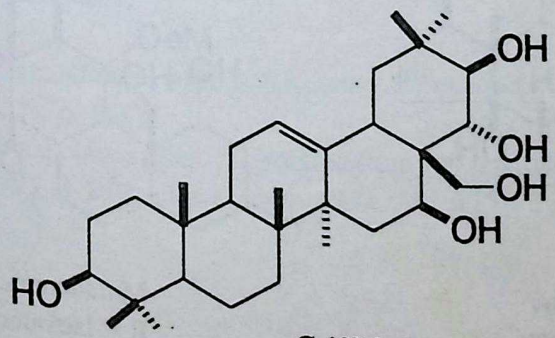
MARSDENIA (Asclepiadaceae)

M. griffithii Hook.f.

A new triterpenoid - griffithol - isolated from stems and its structure determined; in addition, oleanolic acid, longispinogenin and chichipegenin isolated (*Yunnan Zhiwu Yanjiu* 1992, *14,* 323; *Chem. Abstr.* 1993, *118,* 209387 f).

Distribution: Meghalaya, alt. 1200-1800 m.

NEW COMPOUNDS



Griffithol

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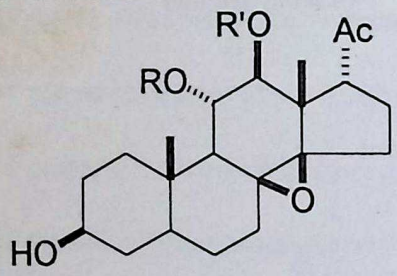
M. tenacissima (Roxb.) Moon (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 458).

Six new polyoxypregnanes (I-VI) isolated and characterised as 11α-O-tigloyl-12β-O-acetyltenacigenin B, 11α-O-benzoyl-12β-O-acetyltenacigenin B, 11α-O-[2-methylbutyryl]-12β-O-acetyltenacigenin B, 11α-O-[2-methylbutyryl]-12β-O-tigloyltenacigenin B, 11α-O-[2-methylbutyryl]-12β-O-benzoyltenacigenin B and 11α,12β-O-ditigloyl-17β-tenacigenin B respectively (*Phytochemistry* 1993, *34,* 1615).

NEW COMPOUNDS



	R	R'
I	Tigloyl	Acetyl
II	Benzoyl	Acetyl
III	2-Me Butyryl	Acetyl
IV	2-Me Butyryl	Tigloyl
V	2-Me Butyryl	Benzoyl
VI	Tigloyl	Tigloyl

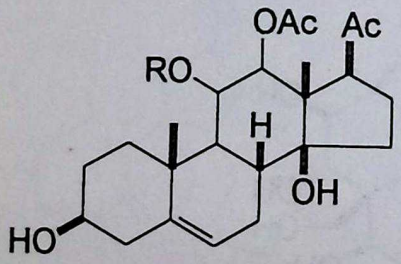
BIOLOGICAL ACTIVITY

Polyoxypregnanes (IV, V and VI) exhibited cytotoxic activity against KB cell line (*Phytochemistry* 1993, *34,* 1615).

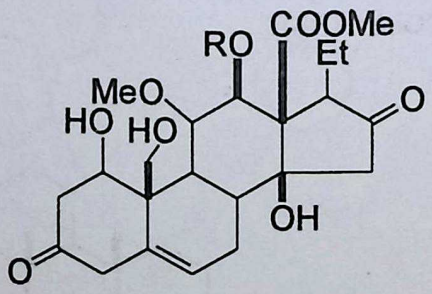
M. tinctoria R.Br. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 162).

A new steroidal alkaloid - tinctoramine - isolated and characterised (*Pharmazie* 1993, *48,* 628; *Chem. Abstr.* 1994, *120,* 4635 e); new steroids - marsdenone and tinctoralactone - from aerial parts and their structure elucidation (*J. Bangladesh Acad. Sci.* 1994, *18,* 39; *Chem. Abstr.* 1994, *121,* 200875 t).

NEW COMPOUNDS



Tinctoramine
R = Nicotinoyl



Marsdenone
R = Isovaleryl

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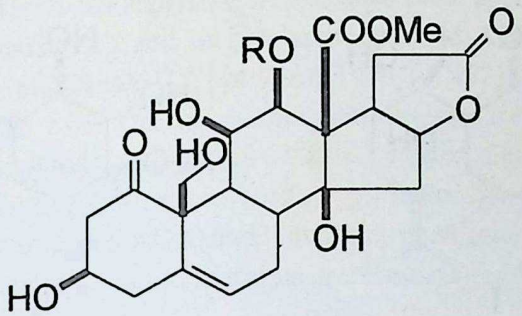

Tinctoralactone
R = Isovaleryl

BIOLOGICAL ACTIVITY

Tinctoralactone exhibited antifertility and oxytocic activities in experimental animals (*J. Bangladesh Acad. Sci.* 1994, *18,* 39; *Chem. Abstr.* 1994, *121,* 200875 t).

MARSILEA (Marsiliaceae)

M. minuta L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 411).

Protocatechuic, caffeic, p-coumaric, vanillic and ferulic acids isolated (*Indian J. Plant Physiol.* 1992, *35,* 275; *Chem. Abstr.* 1993, *119,* 113341 f).

MARTYNIA (Martyniaceae)

M. annua L. syn. *M. diandra* Glox. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 446).

5,7,4'-Trihydroxy-3'-methoxyflavone (0.01) and its 7-O-β-glucuronide (0.05%) determined in plant (*Fitoterapia* 1992, *63,* 88).

M. diandra Glox.; see *M. annua* L.

MATRICARIA (Asteraceae)

M. aurea (L.) Boiss. syn. *Cotula aurea* L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 162).

Two new bisabolanes (I and II) isolated from aerial parts and their structures established (*Nat. Prod. Lett.* 1993, *3,* 277; *Chem. Abstr.* 1994, *121,* 175175 e).

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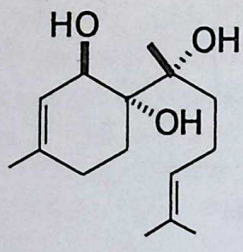
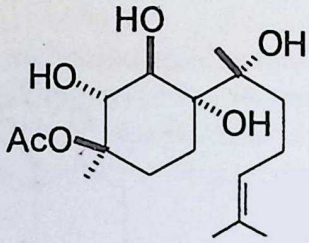
NEW COMPOUNDS



I



II

M. chamomilla L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 459).

Oil exhibited stronger antimicrobial activity against Gram -ve bacteria (*Herba Pol.* 1991, *37,* 29; *Chem. Abstr.* 1992, *116,* 158677 z).

Apigenin (0.33) and its glucoside (2.39%) determined in flowers (*Arh. Farm.* 1989, *39,* 163; *Chem. Abstr.* 1990, *113,* 158767 s); chamazulene, spiroether, α-bisabolol and its oxides isolated from oil (*Herba Pol.* 1991, *37,* 29; *Chem. Abstr.* 1992, *116,* 158677 z); isolation of new phenolic compound, 1-[(2-hydroxy-4-methoxy)cinnamoyl]-β-D-glucose (*Farm. Zh.* (Kiev) 1992, 80; *Chem. Abstr.* 1993, *118,* 35935 r); synthesis of α-bisabolol (*Huaxue Shijie* 1993, *34,* 308; *Chem. Abstr.* 1994, *121,* 205714 z).

BIOLOGICAL ACTIVITY

Chamazulene and α-bisabolol showed strong antimicrobial activity; latter was strongly active against both Gram +ve and Gram -ve bacteria as well as pathogenic fungi. α-Bisabolol oxides showed considerably weaker activity, whereas spiroether was weakly active against Gram +ve bacteria, inactive against Gram -ve bacteria and moderately active against fungi (*Herba Pol.* 1991, *37,* 29; *Chem. Abstr.* 1992, *116,* 158677 z).

MAYTENUS (Celastraceae)

M. emarginata (Willd.) Ding Hou; see *M. senegalensis* (Lamk.) Exell

M. rothiana (Walp.) A. Callen syn. *Gymnosporia rothiana* (Walp.) Lawson (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 414).

n-Octacosanol, β-amyrin, β-sitosterol isolated from leaves and quercetin-3-O-rhamnobioside, quercetin-3-O-galactoside, rutin and dulcitol from fruits (*Indian J. Pharm. Sci.* 1989, *51,* 31).

M. senegalensis (Lamk.) Exell syn. *Gymnosporia spinosa* (Forsk.) Fiori, *G. montana* (Roth) Benth., *G. emarginata* (Willd.) Thw., *G. senegalensis* (Lamk.) Loes., *Maytenus emarginata* (Willd.) Ding Hou (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 414).

A new sesquiterpene pyridine alkaloid - emarginatine A - isolated and its structure and

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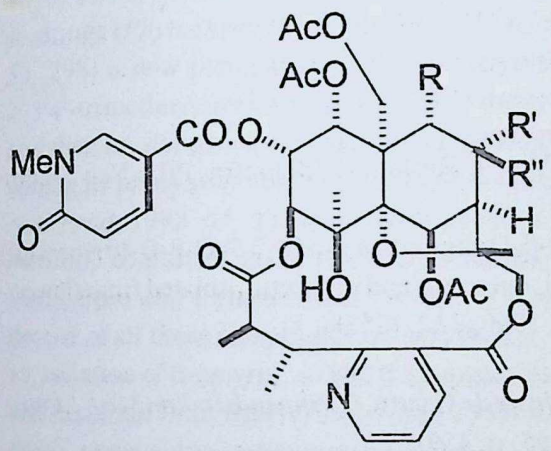
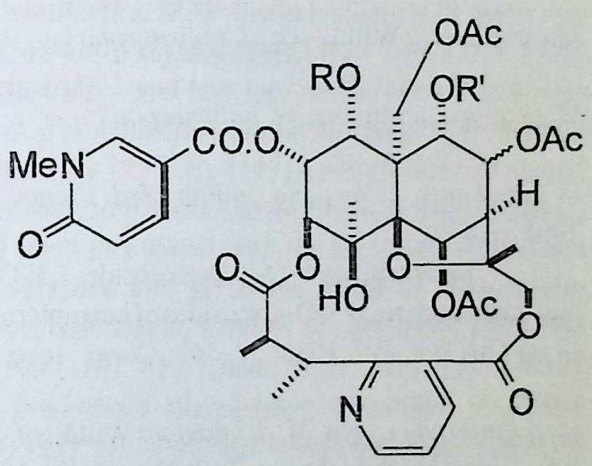
stereochemistry determined by X-ray analysis (*Heterocycles* 1989, *29,* 1465); isolation of another related alkaloid - emarginatine B - and its characterisation as 9-benzoate of C-8-epimer of emarginatine A; maytansine also isolated (*J. Nat. Prod.* 1990, *53,* 422); friedelan-3-one, β-amyrin, 29-norcycloartanol, quercetin, myricetin and isorhamnetin isolated from leaves (*Indian J. Chem.* 1992, *31*B, 639); leaves contained palmitic acid (*Indian J. Pharm. Sci.* 1993, *55,* 100); isolation of β-sitosterol, β- and δ-amyrins from leaves (*Indian J. Pharm. Sci.* 1993, *55,* 234); four new sesquiterpene alkaloids - emarginatines C, D and E and emarginatinine - isolated (*Phytochemistry* 1994, *35,* 803); two more new alkaloids - emarginatines F and G - isolated and characterised (*J. Nat. Prod.* 1994, *57,* 263).

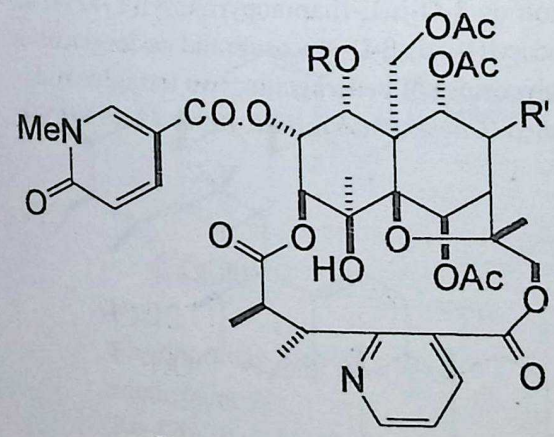
NEW COMPOUNDS



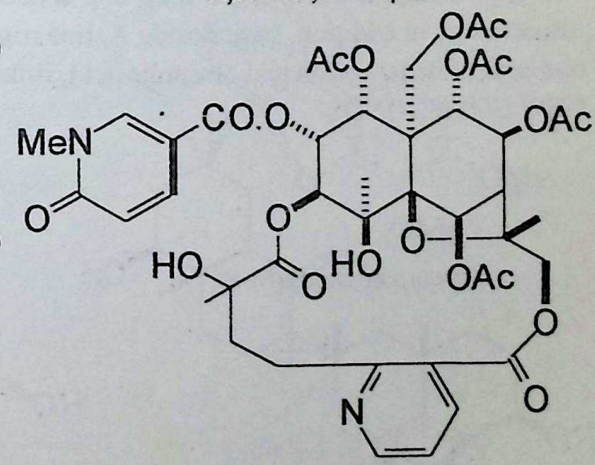
Emarginatine A
R,R' = OAc, R'' = H
Emarginatine B
R = Benzoyloxy, R' = H, R'' = OAc



Emarginatine C
R = Ac, R' = H, ~ = α
Emarginatine D
R = H, R' = Ac, ~ = α
Emarginatine E
R,R' = H, ~ = β



Emarginatine F
R = Benzoyl, R' = β-OH
Emarginatine G
R = COC(Me)=CH)Me), R' = α-OAc



Emarginatinine

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BIOLOGICAL ACTIVITY

Emarginatine B showed potent cytotoxicity against human KB cells with ED50 0.4 μg/ml (*J. Nat. Prod.* 1990, *53,* 422); cytotoxicity against human KB cells was also shown by emarginatine E and emarginatinine with ED50 2.5 and 2.1 μg/ml respectively (*Phytochemistry* 1994, *35,* 803); emarginatine F was strongly cytotoxic to human epidermoid carcinoma of nasopharynx (KB), ileocecal adenocarcinoma (HCT-8), melanoma (RPMI-7951), medulloblastoma (TE-671) and murine leukaemia (P-388) cells (*J. Nat. Prod.* 1994, *57,* 263).

MEDICAGO (Papilionaceae)

M. denticulata Willd.; see *M. polymorpha* L.

M. hispida Gaertn.; see *M. polymorpha* L.

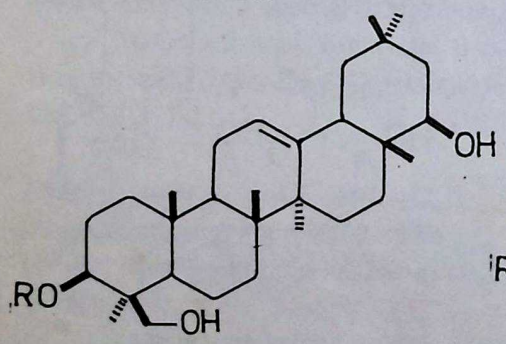
M. lupulina L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 459).

Laricitrin, its 5'-O-β-D-glucoside, 3,5'-O-β-D-diglucoside and 3,7,5'-O-β-D-triglucoside and uncharacterised 3-O-glycosides of kaempferol, quercetin and myricetin isolated from flowers (*Acta Soc. Bot. Pol.* 1988, *57,* 563; *Chem. Abstr.* 1990, *112,* 175580 x).

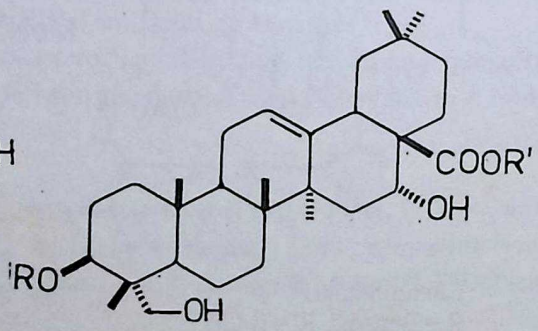
M. polymorpha L. syn. *M. denticulata* Willd., *M. hispida* Gaertn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 459).

Isolation of 5,4'-dihydroxy-3,7-dimethoxyflavone, 5,4'-dihydroxy-7-methoxyflavone and apigenin (*J. Indian Chem. Soc.* 1989, *66,* 422); new triterpenoid saponin - hispidacin - isolated; structures of hispidacin and soyasaponin III elucidated by mass and ^{13}C-NMR spectroscopy (*Phytochemistry* 1991, *30,* 3389); two more triterpenoid saponins - medicago saponins P1 and P2 - from aerial parts and their characterisation as 3-O-α-L-rhamnopyranosyl(1→2)-α-L-arabinopyranosylcaulophyllogenin-28-O-β-D-glucosyl(1→6)-β-D-glucoside and its desglucoside respectively; in addition, sapindoside A, two triglycosides of hederagenin, two tetraglycosides, one each of hederagenin and oleanolic acid, isolated (*Chem. Pharm. Bull.* 1994, *42,* 1339).

NEW COMPOUNDS



Hispidacin
R = Gluc.acid(2→1)Glu(2→1)Rha



Medicago saponin P1
R = Ara(2→1)Rha, R' = Glu(6→1)Glu
Medicago saponin P2
R = Ara(2→1)Rha, R' = Glu

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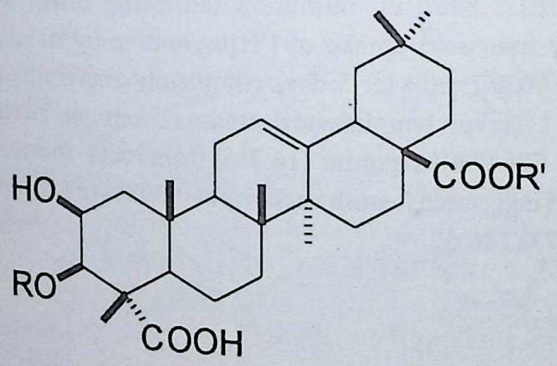
M. sativa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 460).

Myo-inositol identified in leaves by GC-MS (*Acta Physiol. Plant.* 1989, *11,* 97; *Chem. Abstr.* 1990, *113,* 168942 j); new oleanene saponin (I) isolated from roots and characterised (*Carbohydr. Res.* 1989, *193,* 115; *Chem. Abstr.* 1990, *112,* 52257 q); isolation and structure determination of - medicoside H - from roots (*Khim. Prir. Soedin.* 1989, 673; *Chem. Abstr.* 1990, *112,* 95535 w); another new triterpene glycoside - medicoside L - from roots and its structure elucidation (*Khim. Prir. Soedin.* 1990, 221; *Chem. Abstr.* 1990, *113,* 94784 k); glycosides of medicagenic acid, hederagenin and soyasapogenol B isolated from roots, evaluated for antifungal activity and their structure-activity relationship established (*J. Agric. Food Chem.* 1990, *38,* 1810; *Chem. Abstr.* 1990, *113,* 129386 m); identification of N^6-methylagmatine in seeds and seedlings (*Phytochemistry* 1990, *29,* 1313); ^{13}C-NMR of soyasapogenol B (*J. Nat. Prod.* 1990, *53,* 298) a new pterocarpan - 10-methoxymedicarpin - and two new isoflavans - 7-hydroxy-2',3'4'-trimethoxyisoflavan and 7,5'-dihydroxy-2',3',4'-trimethoxyisoflavan - isolated from plant and their crystal structures determined (*Phytochemistry* 1991, *30,* 4147) a new labile O-22-maltol conjugate of soyasaponin - soyasaponin VI - isolated from seeds and its structure determined (*J. Nat. Prod.* 1992, *55,* 1339); exudate of root of plant inoculated with the bacterium *Rhizobium meliloti,* contained three isoflavonoids, the aglycone and glycoside forms of phytoalexin, medicarpin and formononetin-7-O-(6"-O-malonyl)glycoside; exudate of uniculated plant was devoid of all these compounds (*Plant Physiol.* 1993, *101,* 819; *Chem. Abstr.* 1993, *118,* 230407 x); isolation of β-amyrin, α- and β-spinasterols, β-sitosterol, stigmasterol, myrsellinol, scopoletin and esculetin from fruits (*Fitoterapia* 1993, *64,* 381); anticholesterolaemic and hypolipidaemic drugs, canavanine and cumestrol isolated (Ger. 4,242,149 (1993) Jun. 17; *Chem. Abstr.* 1993, *119,* 103318 q).

NEW COMPOUNDS



I

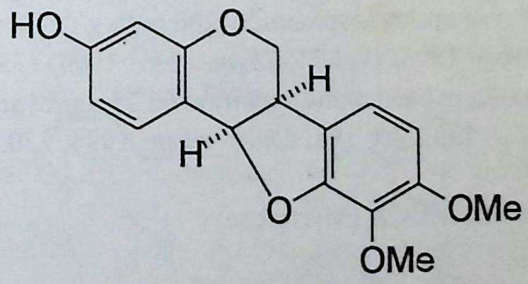
R = Glu(4→1)Glu, R' = H

Medicoside H

R = Glu, R' = Ara(2→1)Rha

Medicoside L

R = Glu(2→1)Glu[(2→1)Glu](3→1)Rha, R' = Glu



10-Methoxymedicarpin

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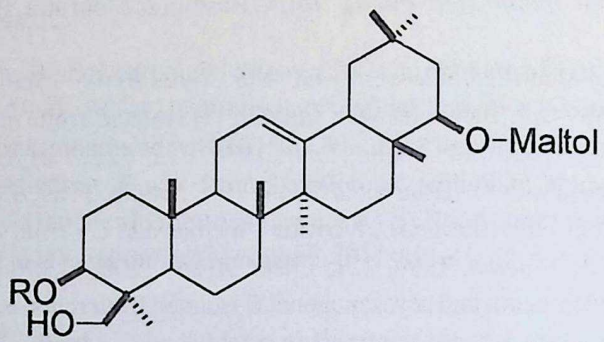

Soyasaponin VI
R = Gluc.acid(2→1)Gal(2→1)Rha

BIOLOGICAL ACTIVITY

Saponin (I) (40.0 μg/ml) exhibited or antimycotic activity against *Sclerotium rolfsii, Fusarium oxysporum, Rhizoctonia solani, Trichoderma viride, Aspergillus niger* and *Phythium aphanidermatum* with percentage inhibition 90.0, 57.0, 67.0 and 68.0 respectively (*Carbohydr. Res.* 1989, *193,* 115; *Chem. Abstr.* 1990, *112,* 52257 q); sialic acid showed anti-inflammatory activity against carrageenin-induced paw oedema in mice (*Zhongguo Yiyao Gongye Zazhi* 1989, *20,* 457; *Chem. Abstr.* 1990, *112,* 111737 w); topical application of compound G2, from root, to skin lesions of guinea pigs, experimentally-infected with dermatophyte, *Trichophyton mentagrophytes* var. *granulare*, cured 80% of infected lesions (*Antimicrob. Agents Chemother.* 1990, *34,* 1600; *Chem. Abstr.* 1990, *113,* 144922 b); medinaside and medicosides A, C, G, I, H and J showed varying degrees of fungicidal activity against *Candida albicans, Trichoderma viride and Saccharomyces cerevisiae* and bacterial activity against *Bacillus mesentericum.* Some saponins also exhibited plant growth regulating activity (*Bull. Acad. Stiinte Repub. Mold. Stiinte Biol. Chim.* 1992, 24; *Chem. Abstr.* 1994, *121,* 5336 r); immunopotentiating effect of polysaccharides (250 to 500 μg/ml) shown by increased uptake of [^{3}H]thymidine by mouse lymphocyte *in vitro*. Its administration (250 mg/kg/d, i.p.) for 5 days completely antagonised effect of cyclophosphamide (200 mg/kg/day for 1 day) on lymphocyte decrease (*Zhongguo Yaoli Xuebao* 1993, *14,* 273; *Chem. Abstr.* 1993, *119,* 62647 a); saponins (16.7%) from roots, showed maximum haemolytic activity at 62.25 μg/ml and detectable foaming activity at 0.002% (*Pakistan Vet. J.* 1993, *13,* 185; *Chem. Abstr.* 1994, *120,* 173186 q).

MELALEUCA (Myrtaceae)

M. leucadendron (L.) L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 461).

Chloroform and methanolic extracts of fruits strongly inhibited histamine release from rat mast cells.

Ursolic acid isolated from chloroform extract and piceatannol and oxyresveratrol from methanolic extract, identified as active compounds (*Chem. Pharm. Bull.* 1991, *39,* 3276).

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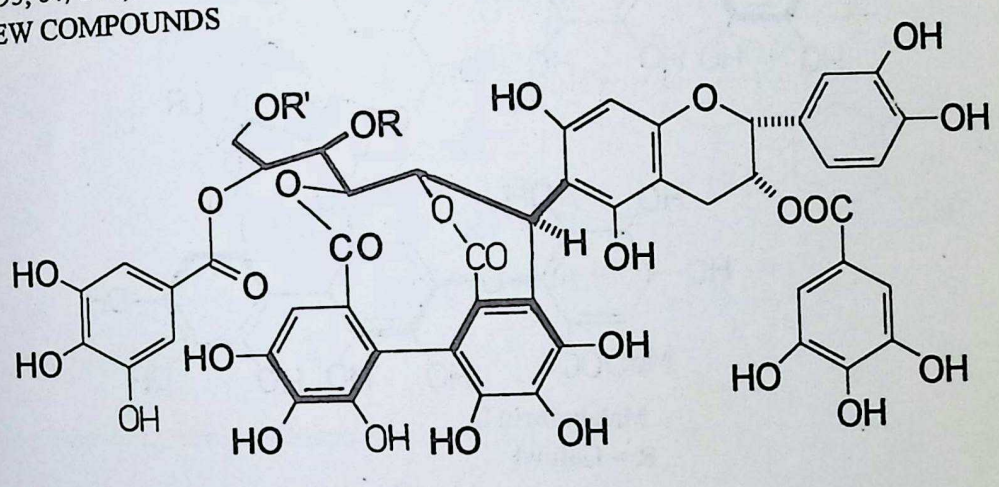
MELASTOMA (Melastomataceae)

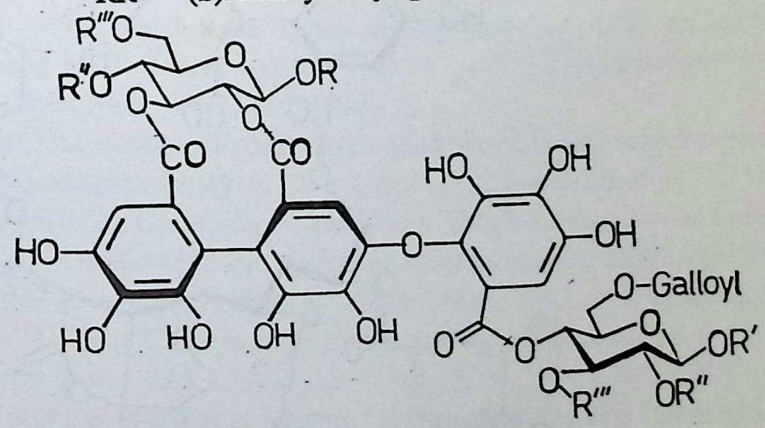
M. malabathricum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 462)

Three new complex tannins - malabathrins A, E and F - isolated from leaves and characterised (*Chem. Pharm. Bull.* 1992, *40,* 1727); three new hydrolysable tannin dimers - malabathrins B, C and D - isolated from leaves and their structures established; nobotanins B, G, H and J also isolated (*Phytochemistry* 1992, *31,* 2829); isolation of a new anthocyanin - 4'-methylpeonidin-7-O-β-D-glucoside - along with kaempferol and its 3-O-β-D-xyloside (*Fitoterapia* 1993, *64,* 277).

NEW COMPOUNDS



Malabathrin A
RR' = -(S)Hexahydroxydiphenoyl -



Malabathrin B
R = Galloyl, R' = H, R'' R''' = -(S)Hexahydroxydiphenoyl-
Malabathrin C
R = H, R' = Galloyl, R'' R''' = -(S)Hexahydroxydiphenoyl-

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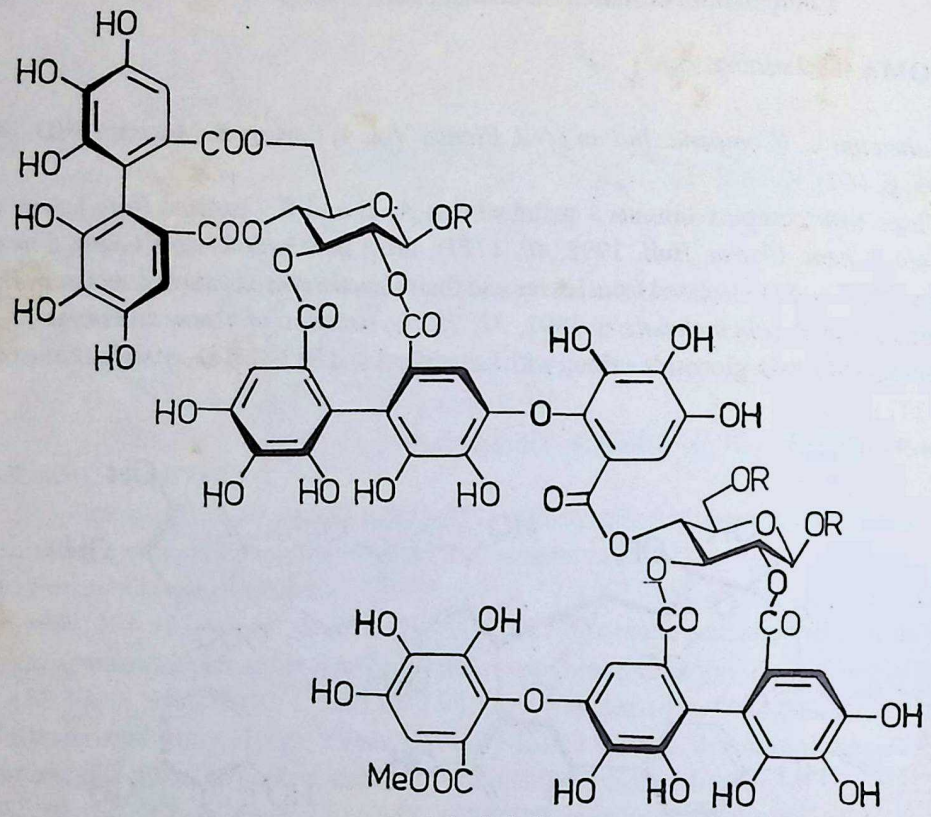
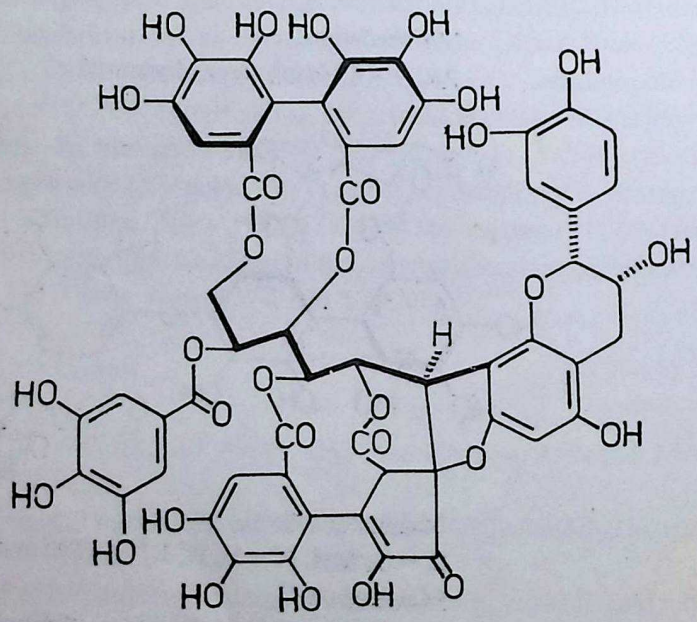


Malabathrin D
R = Galloyl



Malabathrin E

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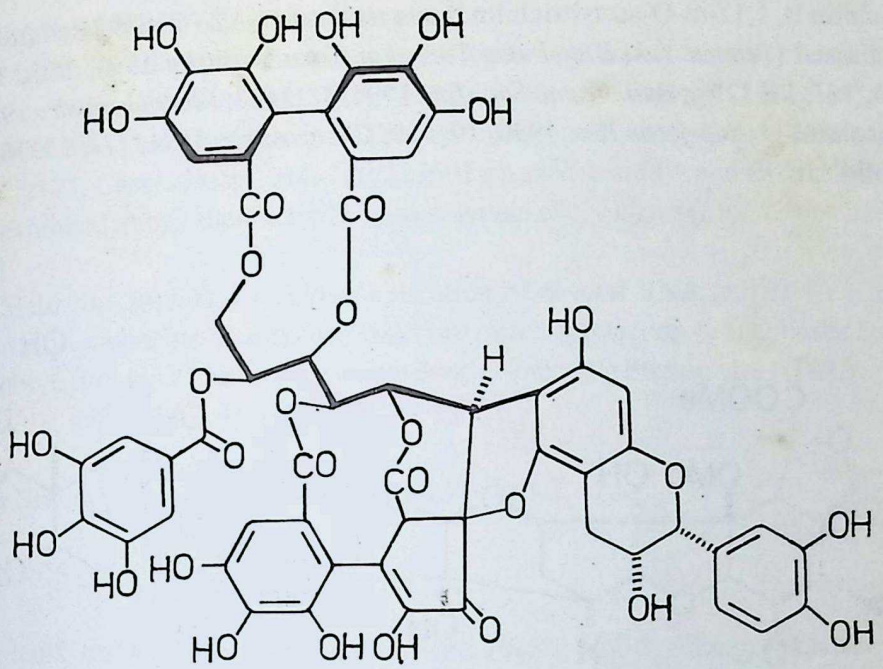

Malabathrin F

MELIA (Meliaceae)

M. azadirachta L.; see *Azadirachta indica* (L.) A.Juss.

M. azedarach L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 463).

Leaf extract inhibited growth of 4th instar larvae of *Epilachna varivestis*; an active principle isolated which caused 100% larval mortality at >2 ppm (*Z. Pflanzenkrankh. Pflanzenschutz* 1991, *98,* 422; *Chem. Abstr.* 1992, *116,* 18403 g).

Saturated fatty acids (10.3%) consisted of palmitic (6.3) and stearic (4.0%) acids whereas unsaturated fatty acids (89.75%) comprised linoleic (57.0), oleic (31.5), and linolenic (1.2%) acids (*J. Nepal Chem. Soc.* 1991, *10,* 25; *Chem. Abstr.* 1993, *118,* 35875 w); isolation of a new compound - melianoninol - from fruits; in addition, melianol, melianone, meliandiol, vanillin and vanillic acid isolated (*J. Chin. Pharm. Sci.* 1992, *1,* 7; *Chem. Abstr.* 1993, *119,* 45222 r); a new antifeedant isolated from root bark of Chinese plant and its structure elucidated as 1-deoxy-3-tigloyl-n-methoxymeliacarpinin (*Chem. Lett.* 1993, 2125; *Chem. Abstr.* 1994, *120,* 129501 q); antifeedant limonoids isolated from stem and root bark of Chinese plant and characterised as fraxinellone, its 6α-acetyl derivative, 1-cinnamoyl-3-acetyl-11-methoxymeliacarpinin and 3-tigloyl-11-methoxymeliacarpinin (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1993, 35th, 385; *Chem. Abstr.* 1994, *121,* 175125 p); in addition, new azedarachins - azedarachins A, B, C and 12-O-acetylazedarachins A and B - and six trichilins - trichilins B, D (meliatoxin A1), H, 12-

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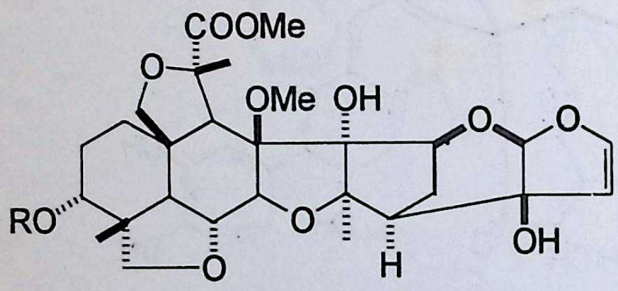
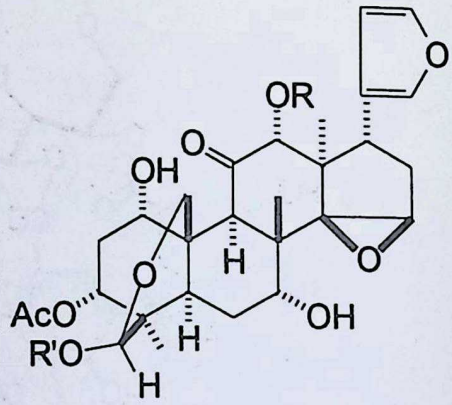
O-acetyltrichilin B, 1,12-di-O-acetyltrichilin B and meliatoxin A2 - also isolated from root bark and characterised (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1993, 35th, 385; *Chem. Abstr.* 1994, *121*, 175125 p; *Bull. Chem. Soc. Jpn.* 1994, *67*, 2468; *Phytochemistry* 1994, *36*, 39); meliacine isolated (*J. Interferon Res.* 1990, *10*, 469; *Chem. Abstr.* 1991, *114*, 55336 s).

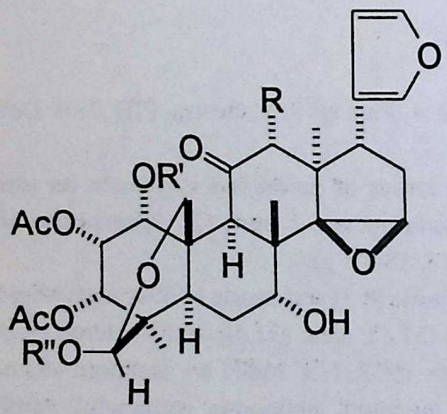
NEW COMPOUNDS



1-Deoxy-3-tigloyl-11-methoxymeliacarpinin
R = Tigloyl



Azedarachin A
R = H, R' = 2-Me Butyryl
12-O-Acetylazedarachin A
R = Ac, R' = 2-Me Butyryl
Azedarachin B
R = H, R' = Isobutyryl
12-O-aceylazedarachin B
R = Ac, R' = Isobutyryl



	R	R'	R"
Trichilin B	OH	H	2-Me Butyryl
Trichilin D	H	H	2-Me Butyryl
Trichilin H	OAc	H	Isobutyryl
12-O-Acetyl trichilin B	OAc	H	2-Me Butyryl
1,12-Di-O-acetyl trichilin B	OAc	Ac	2-Me Butyryl
Meliatoxin A2	H	H	Isobutyryl

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BIOLOGICAL ACTIVITY

Melianoninol exhibited antifeedant activity against cabbage worm (*J. Chin. Pharm. Sci.* 1992, *1*, 7; *Chem. Abstr.* 1993, *119*, 45222 r); 1-deoxy-3-tigloyl-11-methoxymeliacarpinin completely inhibited feeding of larvae of *Spodoptera exigua* at concentration of 3.0 μg/cm² (*Chem. Lett.* 1993, 2125; *Chem. Abstr.* 1994, *120*, 129501 q); azedarachin A and 12-O-acetylazedarachins A and B exhibited antifeedant activity against larvae of *S. exigua* (*Bull. Chem. Soc. Jpn.* 1994, *67*, 2468).

Meliacine inhibited *in vitro* replication of several RNA and DNA animal viruses. Treatment with meliacine greatly depressed interferon production in L929 cells and in primary mouse embryo fibroblast cultures inoculated with Newcastle disease virus (DNA) (*J. Interferon Res.* 1990, *10*, 469; *Chem. Abstr.* 1991, *114*, 55336 s).

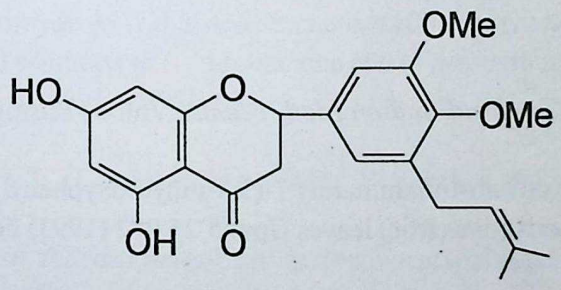
M. indica Brandis; see *Azadirachta indica* (L.) A.Juss.

MELILOTUS (Papilionaceae)

M. alba Medik. ex Desr. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 419).

Isolation and characterisation of a prenylated flavanone (I) from leaves and flowers of plant from Greece (*Sci. Pharm.* 1992, *60*, 101; *Chem. Abstr.* 1993, *118*, 251410 h).

NEW COMPOUNDS



I

M. officinalis (L.) Medik. ex Desr. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 465).

Salicylic, p-hydroxybenzoic, p-hydroxyphenylacetic, vanillic, gentisic, protocatechuic, syringic, p-hydroxyphenyllactic, gallic, caffeic, melilotic, o-and p-coumaric, ferulic and sinapic acids identified (*Pharmazie* 1991, *46*, 156; *Chem. Abstr.* 1991, *114*, 225712 f).

MELISSA (Lamiaceae)

M. parviflora Benth. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 164).

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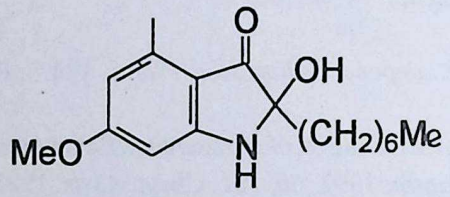
Essential oil (2.0%) of aerial parts consisted of geraniol (21.01), linalool (13.36), citral (13.0), (+)limonene (12.95), 1,8-cineole (9.33), citronellol (8.2), citronellal (4.0), thymol (4.0), (+)camphene (2.5), α-pinene (2.3), (–)β-pinene (2.13), car-3-ene (2.05), citronellic acid (2.0), nepetalactone (1.91) and azulene (1.26%) (*Perfuem. Kosmet.* 1992, *73,* 154, 158; *Chem. Abstr.* 1992, *117,* 178070 v).

MELOCHIA (Sterculiaceae)

M. corchorifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 466).

A new pseudooxindole alkaloid - melochicorine - isolated and characterised as 2-heptyl-2-hydroxy-4-methyl-6-methoxypseudooxindole; cyclopeptide alkaloid, franganine, also isolated (*Phytochemistry* 1991, *30,* 3159).

NEW COMPOUNDS



Melochicorine

MENTHA (Lamiaceae)

M. haplocalyx Briq. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 421).

Isolation of seven anti-inflammatory 1-(3,4-dihydroxyphenyl)-1,2-dihydronaphthalene-2,3-dicarboxylic acid derivatives from leaves (Jpn. 5,25,082 (1993) Feb. 02; *Chem. Abstr.* 1993, *118,* 240926 e).

BIOLOGICAL ACTIVITY

1-(3,4-Dihydroxyphenyl)-1,2-dihydronaphthalene-2,3-dicarboxylic acid derivatives evaluated as anti-inflammatory agents, showed IC50 of 13.1-63.7 μg/ml against 3α-hydroxysteroid dehydrogenase as compared to 1.15 mg/ml for aspirin (Jpn. 5,25,082 (1993) Feb. 02; *Chem. Abstr.* 1993, *118,* 240926 e).

M. longifolia (L.) Huds.syn. *M. sylvestris* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 468).

Essential oil exhibited CNS depressant effect in mice and rats (*Phytother. Res.* 1990, *4,* 232; *Chem. Abstr.* 1991, *114,* 178259 b).

Diosphenol (47.7) and rotundifolone (33.2%) determined in oil (*Phytother. Res.* 1990,

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4, 232; *Chem. Abstr.* 1991, *114*, 178259 b); determination of 1,8-cineole (28.77), cis-piperitone oxide (15.36), piperitone (13.87) and piperitenone (13.84%) in oil of plant from Sinai whereas oil plant from Judean desert contained pulegone (70.0%) (*J. Essent. Oil Res.* 1991, *3*, 57; *Chem. Abstr.* 1991, *115*, 10534 e).

M. longifolia (L.) Huds. ssp. *himalaiensis* Briq.

Oil showed pesticidal activity against *Sitophilus oryzae* (*Fitoterapia* 1989, *60*, 349).

Cis-piperitone oxide, piperitenone oxide and 4-hydroxypiperitone identified as major components in essential oil by GC-MS (*Proc. Int. Congr. Essent. Oils, Fragrances Flavours* 11th, 1989, 177; *Chem. Abstr.* 1992, *117*, 198206 x; *Fitoterapia* 1989, *60*, 349).

Distribution: Western Himalayas, alt. 2100-3900 m.

M. piperita L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 468).

Peppermint oil relaxed carvachol-contracted guinea pig tenia coli (IC50 21.1 μg/ml) and inhibited spontaneous activity in guinea pig colon (IC50 25.9 μg/ml) and rabbit jejunum (IC50 15.2 μg/ml). It relaxes gastrointestinal smooth muscle by reducing calcium influx (*Gastroenterology* 1991, *101*, 55; *Chem. Abstr.* 1991, *115*, 105797 m); peppermint oil reduced gastric emptying time (GE t) in dyspeptics to the basal GE t in healthy male volunteers which indicates its possible therapeutic benefit in dyspepsia. GE t was significantly more in older than in younger volunteers (*Indian J. Physiol. Pharmacol.* 1991, *35*, 212).

Synthesis of 5,6-dihydroxy-7,8,3',4'-tetramethoxyflavone (*Indian J. Chem.* 1989, *28*B, 1063); stereoselective total synthesis of (–)mintlactone and (+)isomintlactone (*Tetrahedron Lett.* 1991, *32*, 5191; *Tetrahedron* 1993, *49*, 6429).

M. spicata L. syn. *M. viridis* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 469).

Neodihydrocarveol, dihydrocarveol, cis- and trans-carveol and 3-octanol-β-D-glucoside isolated as tetraacetyl derivatives (*Kiyo-Iida Joshi Tanki Daigaku* 1994, *12*, 73; *Chem. Abstr.* 1994, *121*, 226383 f).

M. spicata L. var. *crispa* (L.) Benth.

(–)Carvone detected as major component in Nepalese plant by GC-MS (*J. Essent. Oil Res.* 1991, *3*, 447; *Chem. Abstr.* 1992, *116*, 37977 p).

Distribution: Nepal.

M. sylvestris L.; see *M. longifolia* (L.) Huds.

M. viridis L.; see *M. spicata* L.

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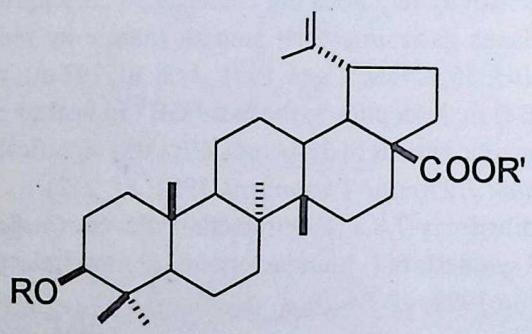
MENYANTHES (Gentianaceae)

M. trifoliata L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 469).

Effect of aqueous extract of rhizomes, p.o. was studied in rats, before and 45 min after exposure to renal ischemia. Like all platelet-activating factor (PAF) antagonists, it showed concentration-dependent inhibition of exocytosis of activated neutrophils, with IC50 160 μg/ml, suggesting that higher glomerular filtration rate seen after acute renal failure and treatment with extract, could partly be due to PAF-antagonistic effect (*Phytomedicine* 1994, *1,* 39; *Chem. Abstr.* 1994, *121,* 245674 t).

A major saponin - menyanthoside - isolated from rhizomes and characterised (*Phytochemistry* 1990, *29,* 3885); scoparone, braylin (6-methoxyseselin), scopoletin and loliolide isolated from aerial parts (*Plant. Med. Phytother.* 1990, *24,* 73; *Chem. Abstr.* 1991, *114,* 118489 s).

NEW COMPOUNDS



Menyanthoside
R = Gluc.acid(4→1)Gal, R' = Glu(6→1)Apiose

MERIANDRA (Lamiaceae)

M. benghalensis Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 470).

17-Hydroxycryptotanshinone (14,16-epoxy-17-hydroxy-20-nor-abieta-5(10),6,8,13-tetraen-11,12-dione), horminone, its 12-O-methyl derivative and cryptotanshinone isolated from roots (*Phytochemistry* 1992, *31,* 3953).

MERREMIA (Convolvulaceae)

M. dissecta (Jacq.) Hallier f. syn. *Ipomoea sinuata* Ortega (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 470).

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Two new cyanogenic glycosides - amygdalin-6"-(4-hydroxy)benzoate and amygdalin-6"-(4-hydroxy)-(E)cinnamate - isolated from seeds along with amygdalin (*Phytochemistry* 1990, *29*, 1179).

M. tridentata (L.) Hallier f. ssp. *tridentata* syn. *Ipomoea tridentata* (L.) Roth (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 166).

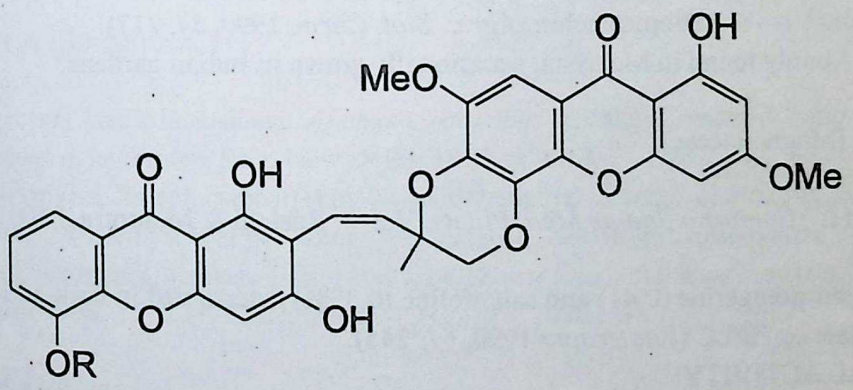
Diosmetin, luteolin and their 7-O-glucosides isolated (*Fitoterapia* 1992, *63*, 190).

MESUA (Clusiaceae)

M. ferrea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 472).

Dehulled nuts contained oil (55.18%) which yielded oleic (50.56), palmitic (16.96), linolenic (15.2), stearic (14.97), linoleic (1.75%) and palmitoleic acids (*Dhaka Univ. Stud.* 1992, *40*B, 123; *Chem. Abstr.* 1992, *117*, 128158 j); octadecatrienoic and hexadecanoic acids identified in seed oil (*Indian J. For.* 1992, *15*, 281; *Chem. Abstr.* 1993; *119*, 113349 q); two new bisxanthones - mesuabixanthones A and B - isolated from stem bark and characterised; in addition, betulinic acid , (–)epicatechin, 1,6-dihydroxyxanthone and pyranojacareubin isolated (*Nat. Prod. Lett.* 1993, *3*, 53; *Chem. Abstr.* 1994, *120*, 294130 a).

NEW COMPOUNDS



Mesuabixanthone A
R = H
Mesuabixanthone B
R = Me

METASEQUOIA (Taxodiaceae)

M. glyptostroboides Hu & Cheng (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 472).

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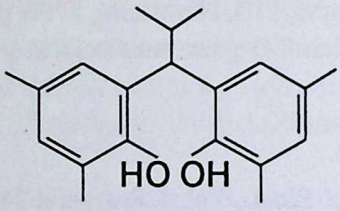
Identification of α-pinene, α-humulene and β-caryophyllene in essential oil of foliage (*Mukogawa Joshi Daigaku Kiyo, Kaseigakubu-hen* 1991, *39*, 63; *Chem. Abstr.* 1992, *117*, 248540 z); a symmetrical diphenylmethane - metaseol - isolated from root bark and its structure established (*Phytochemistry* 1991, *30*, 1034).

NEW COMPOUNDS



Metaseol

BIOLOGICAL ACTIVITY

Metaseol exhibited antibacterial activity against *Bacillus subtilis* and *Escherichia coli* at 5.0 μg/disk (*Phytochemistry* 1991, *30*, 1034).

METROXYLON (Arecaceae)

M. sagus Rottb.

H. - Sabudana; Eng. - Sago palm.

Isolation of ent-epicatechin(4α→8)-catechin, ent-epicatechin(4α→8)-epicatechin and ent-epicatechin(4α→8)-ent-epicatechin (*Agric. Biol. Chem.* 1990, *54*, 217).

Distribution: Mainly found in Malaysia, occasionally grown in Indian gardens.

MICHELIA (Magnoliaceae)

M. champaca L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 474).

Magnosprengerine (0.41) and salicifoline (0.39%) determined in bark and root cortex of Chinese plant by HPLC (*Fitoterapia* 1990, *61*, 245).

BIOLOGICAL ACTIVITY

Magnosprengerine and salicifoline possess lasting muscle-relaxant activity and hypotensive activity (*Fitoterapia* 1990, *61*, 245).

MICROGLOSSA (Asteraceae)

M. pyrifolia (Lamk.) Kuntze syn. *M. volubilis* DC. (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 167).

Four new acetylenic glucosides isolated from leaves and characterised as 3β-D-glucopyranosyloxy-1-hydroxy-6(E)-tetradecene-8,10,12-triyne, 2β-D-glucopyranosyloxy-1-hydroxy-5(E)-tridecene-7,9,11-triyne, 2β-D-glucopyranosyloxy-1-hydroxy-trideca-3,5,7,9,11-

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pentayne and 2β-D-glucopyranosyloxy-1-hydroxy-3(E)-tridecene-5,7,9,11-tetrayne; the aglycones of the first two compounds are new and the aglycone of the last glycoside could only be isolated as a mixture of E/Z-isomers in ratio of 4:1 (*Planta Med.* 1992, *58,* 266); two acetylated aurone glucosides - 6"-acetyl- and 4",6"-diacetylmaritimeins - isolated from plant grown in New Guinea (*Planta Med.* 1994, *60,* 288).

BIOLOGICAL ACTIVITY

2β-D-Glucopyranosyloxy-1-hydroxy-trideca-3,5,7,9,11-pentayne showed antibacterial activity against *Pseudomonas aeruginosa* and *Staphylococcus aureus* (*Planta Med.* 1992, *60,* 266).

M. volubilis DC.; see *M. pyrifolia* (Lamk.) Kuntze

MICROMELUM (Rutaceae)

M. minutum (Forst.f.) Wt. & Arn. syn. *M. pubescens* Blume

Epoxycoumarin and phobalosin isolated from bark and leaves; in addition, leaves contained coumarin and micromelin (*Planta Med.* 1989, *55,* 401).

Distribution: Nepal, Sikkim, North Bengal, Nagaland, Khasi Hills, Bihar, Orissa and Andaman Islands, ascending to 1600 m.

M. pubescens Blume; see *M. minutum* (Forst.f.) Wt. & Arn.

MICROULA (Boraginaceae)

M. sikkimensis (Clarke) Hemsl. syn. *Anchusa sikkimensis* Clarke (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 476).

β-Amyrin, lupeol, cycloartenol, 24-methylenecycloartenol, cholesterol, cholest-7-enol, campesterol, 24-methylcholest-7-enol, β-sitosterol, 22-dihydrospinasterol, brassicasterol, stigmasterol, fucosterol, avenast-7-enol and 7,24(28)-ergostadienol identified in seed oil (*Yunnan Zhiwu Yanjiu* 1990, *12,* 233; *Chem. Abstr.* 1991, *114,* 20981 w).

MIKANIA (Asteraceae)

M. cordata (Burm.f.) R.L. Robinson; see *M. micrantha* Kunth

M. micrantha Kunth syn. *M. cordata* (Burm.f.) R.L. Robinson (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 476).

Oral administration of root extract (50.0, 100.0 or 150.0 mg/kg for 4,8 or 12 weeks) to rat markedly induced uridine diphosphoglucuronyl transferase activities of hepatic microsomes in dose-dependent manner. It also significantly increased activities of microsomal uridine diphosphoglucose dehydrogenase, reduced NADP, quinine reductase and cytosolic glutathione

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S-transferases with concomitant elevation in content of reduced glutathione (*Cancer Lett.* 1994, *81,* 193; *Chem. Abstr.* 1994, *121,* 73267 u).

Stigmasterol, β-sitosterol, mikanolide, dihydromikanolide, deoxymikanolide and scandenolide isolated (*Pharmazie* 1990, *45,* 697; *Chem. Abstr.* 1991, *114,* 3491 u).

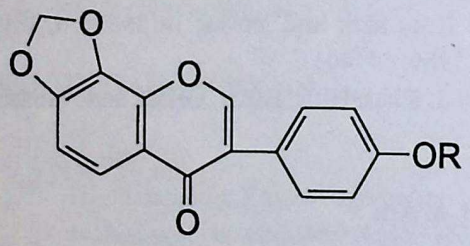
MILLETTIA (Papilionaceae)

M. auriculata Baker ex Brand.; see *M. extensa* (Benth.) Baker

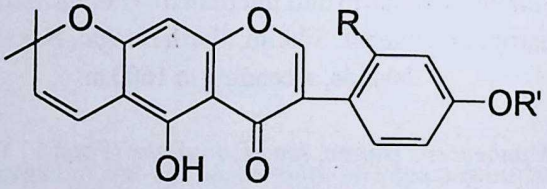
M. extensa (Benth.) Baker syn. *M. auriculata* Baker ex Brand. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 477).

Three new prenylated isoflavones - 2'-deoxyisoauriculatin, 2'-O-methylisoauriculatin and auricularin isolated from roots and characterised; isoauriculatin, auriculin, millettin, auriculatin, scandenone and sumatrol also isolated (*Phytochemistry* 1992, *31,* 1015).

NEW COMPOUNDS



Auricularin
R = $CH_2CH{=}CMe_2$

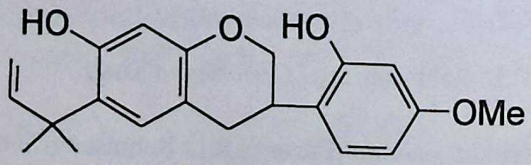


2'-Deoxyisoauriculatin
R = H, R' = $CH_2CH{=}CMe_2$
2'-O-Methylisoauriculatin
R = OMe, R' = $CH_2CH{=}CMe_2$

M. racemosa Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 477).

Isolation of new prenylated isoflavan - 3(R)(–)isomillinol B - from debarked stem and its characterisation; in additon 3(R)(–)vestitol, 3(R)(–)laxifloran, behenic acid, β-sitosterol and β-amyrin isolated (*Phytochemistry* 1994, *35,* 1597).

NEW COMPOUNDS



3(R)(-)Isomillinol B

BIOLOGICAL ACTIVITY

3(R)(–)Isomillinol B and 3(R)(–)vestitol exhibited promising bactericidal activity against *Staphylococcus aureus* and *Escherichia coli* at concentration of 0.1 μg/ml (*Phytochemistry* 1994, *35,* 1597).

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MILLINGTONIA (Bignoniaceae)

M. hortensis L.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 146).

Isolation of trans-1(2'-hydroxyethyl)cyclohexane-1,4-diol from flowers and its crystal structure determination (*Aust. J. Chem.* 1989, *42,* 1397); structure of hortensin, previously elucidated as 3,4'-dihydroxy-6,7-dimethoxyflavone, now revised to 5,4'-dihydroxy-6,7-dimethoxyflavone (cirsimaritin) (*Phytochemistry* 1992, *31,* 671).

BIOLOGICAL ACTIVITY

Hispidulin (64.0 μM) exhibited antiphlogistic effect by inhibiting 5-lipoxygenase (65.0%) in porcine leukocyte suspension (*J. Sci. Soc. Thailand* 1991, *17,* 51; *Chem. Abstr.* 1993, *118,* 225171 m).

MIMOSA (Mimosaceae)

M. pudica L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi,1993, p. 429).

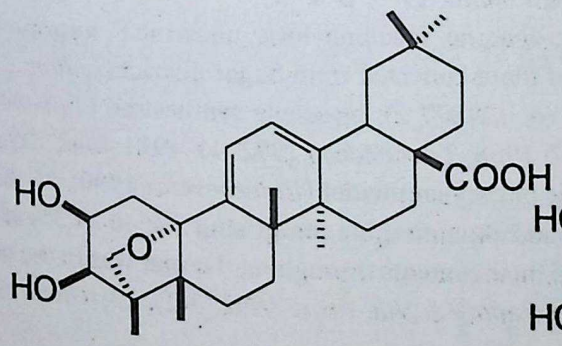
Isolation of 2"-O-rhamnosyl derivatives of orientin and isoorientin from aerial parts (*Planta Med.* 1994, *60,* 194).

MIMUSOPS (Sapotaceae)

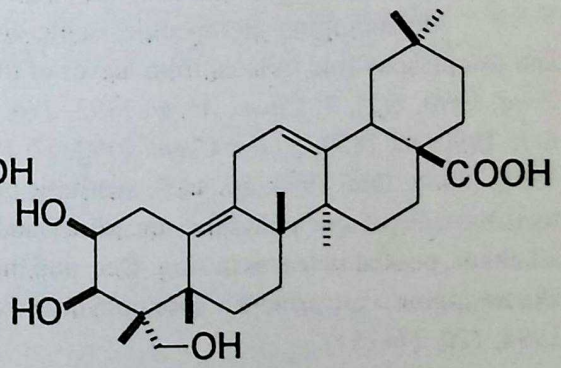
M. elengi L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 479).

Oil (22.4%) from seed kernels yielded oleic (64.1), linoleic (14.5), palmitic (10.7), stearic (10.2) and behenic (0.5%) acids (*Acta Aliment.* 1991, *20,* 103; *Chem. Abstr.* 1991, *115,* 254661 q); two new pentacyclic triterpene acids - mimusopic and mimusopsic acids - from seeds and their characterisation (*Tetrahedron* 1993, *49,* 9031).

NEW COMPOUNDS



Mimusopsic acid



Mimusopic acid

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M. hexandra Roxb.; see *Manilkara hexandra* (Roxb.) Dubard

M. littoralis Kurz; see *Manilkara littoralis* (Kurz) Dubard

MIRABILIS (Nyctaginaceae)

M. jalapa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 479).

Two peptides - Mj-AMP1 and Mj-AMP2 - consisting of 37 and 36 units respectively isolated from seeds (*J. Biol. Chem.* 1992, *267,* 2228; *Chem. Abstr.* 1992, *116,* 148277 e); isolation of α-amyrin and its acetate (*Fitoterapia* 1994, *65,* 177).

BIOLOGICAL ACTIVITY

Peptides, Mj-AMP1 and Mj-AMP2, showed broad spectrum antifungal activity with MIC50 6.0-300.0 μg/ml and 0.5-20.0 μg/ml respectively. They also showed activity against a few Gram +ve bacteria (*J. Biol. Chem.* 1992, *267,* 2228; *Chem. Abstr.* 1992, *116,* 148277 e).

MITRACARPUM (MITRACARPUS) (Rubiaceae)

M. scaber Zucc.

Hexadecanoic (51.2), pentadecanoic, octadec-9(Z)-enoic, tetradecanoic, octadeca-9(Z),12(Z)-dienoic, hexadec-9(Z)-enoic, octadecanoic and dodecanoic acids determined by GC-MS in oil from aerial parts (*Flavour Fragrance J.* 1993, *8,* 269; *Chem. Abstr.* 1994, *120,* 158804 w).

Distribution: Native to Africa, reported to occur in southern India.

MITRAGYNA (Rubiaceae)

M. parvifolia (Roxb.) Korth. syn. *Stephegyne parvifolia* (Roxb.) Korth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 479).

Akuammigine, pteropodine, isopteropodine, speciophylline, uncarine F, mitraphylline and isomitraphylline isolated from leaves of plant collected from Sagar district (*Indian J. Nat. Prod.* 1990, *6*(2), 7; *Chem. Abstr.* 1992, *116,* 124877 z); hirsutene synthesised (*Tetrahedron Lett.* 1990, *46,* 1859; *J. Org. Chem.* 1992, *57,* 1968; *Tetrahedron* 1992, *48,* 1911; *ibid.* 1993, *49,* 7931, 11189; *ibid.* 1994, *50,* 415); synthesis of corynantheidol (*Heterocycles* 1990, *31,* 1351); total N-oxides of speciophylline, uncarine F and akuammigine comprising 5.45 to 24.3% of total alkaloids, peaked in leaves in Aug.-Dec. and their contents throughout the year was in the order: akuammigine > uncarine F > speciophylline (*Indian J. Nat. Prod.* 1992, *8*(2), 29; *Chem. Abstr.* 1994, *120,* 27475 r).

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MOGHANIA (MAUGHANIA) (Papilionaceae)

M. macrophylla (Willd.) O.Ktze.; see *Flemingia macrophylla* (Willd.) O.Ktze. ex Merr.

MOLLUGO (Ficoidaceae)

M. hirta Thunb.; see *Glinus lotoides* L.

M. lotoides (L.) Kuntze; see *Glinus lotoides* L.

MOMORDICA (Cucurbitaceae)

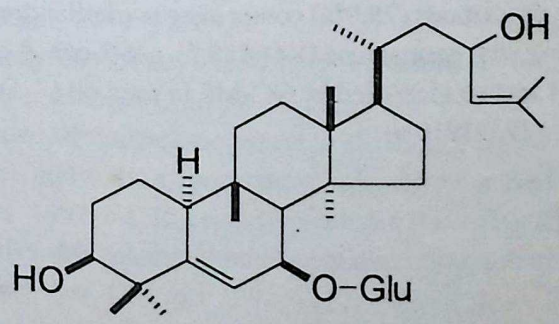
M. balsamina L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 168).

Isolation of verbascoside, calceolarioside and rosmarinic acid from aerial parts (*Planta Med.* 1991, *57,* 201).

M. charantia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 480).

Three new cucurbitane triterpenoids (I, II and III) isolated from leaves and their structures elucidated; in addition, momordicines I and II also isolated (*J. Nat. Prod.* 1990, *53,* 1491);two antimutagenic compounds isolated from green fruits and characterised as 3-O-(6'-O-palmitoyl)-β-D-glucosylstigmasta-5,25(27)-diene (IV) and its steryl derivative (V) (*Mutat. Res.* 1990, *230,* 121; *Chem. Abstr.* 1990, *113,* 148937 h); two new compounds - momorcharasides A and B - isolated from seeds and characterised; in addition, vicine, mycose and 3-O-β-D-glucosyl-24β-ethyl-5α-cholesta-7,22(E),25(27)-trien-3β-ol isolated (*Yaoxue Xuebao* 1990, *25,* 898; *Chem. Abstr.* 1991, *115,* 64133 w); fruit lipids (0.76%) composed of nonpolar lipids (38.81%) containing α-eleostearic acid as major fatty acid; glycolipids comprising linolenic acid and phospholipids comprising palmitic acid as major fatty acid (*J. Agric. Food Chem.* 1991, *39,* 1762; *Chem. Abstr.* 1991, *115,* 181824 h); p-cymene, squalene, (–)menthol, nerolidol, pentadecanol and hexadecanol identified in seed oil (*Dev. Food Sci.* 1992, *29,* 153; *Chem. Abstr.* 1992, *117,* 211199 u).

NEW COMPOUNDS



I

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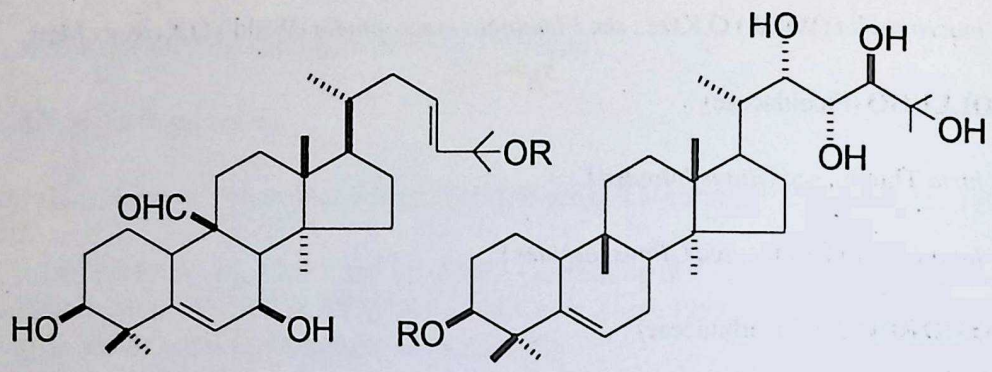

II	Momorcharaside A
R = H	R = Gal(6→1)Gal
III	Momorcharaside B
R = Me	R = Glu

BIOLOGICAL ACTIVITY

Momorcharaside B inhibited DNA and RNA synthesis in S180 tumor cells (*Yaoxue Xuebao* 1990, *25*, 898; *Chem. Abstr.* 1991, *115*, 64133 w); administration of mixture of compounds (IV and V) (50.0-12.5 μg/g) to mice reduced micronucleated polychromatic erythrocytes induced by mitomycin C, a known mutagen, by ~ 80% (*Mutat. Res.* 1990, *230*, 121; *Chem. Abstr.* 1990, *113*, 148937 h).

MONOCELASTRUS (Celastraceae)

M. monosperma (Roxb.) Wang & Tang; see *Celastrus hindsii* Benth.

MONODORA (Annonaceae)

M. myristica (Gaertn.) Dunal (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 483).

Monoterpene hydrocarbons (75.0%) comprising α-phellandrene (50.4), α-pinene (5.5) and myrcene (4.35%) along with germacrene D-4-ol (9.5), car-2-ene, β-caryophyllene, valencene, γ-muurolol and carvacryl acetate identified by GC-MS in seed oil (*J. Sci. Food Agric.* 1993, *61*, 379; *Chem. Abstr.* 1993, *119*, 93918 u).

MONSTERA (Araceae)

M. deliciosa Liebm.

Eng. - Ceriman.

Indole-3-acetic acid identified in protophloem, pericycle, endodermis and

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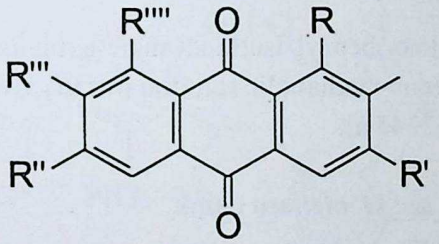
prosclerenchymatous layer of aerial roots (*Vestn. St.-Petersb. Univ., Ser.* 3: *Biol.* 1993, 78; *Chem. Abstr.* 1994, *120,* 73457 k).
Distribution: Native of Central America, introduced into Indian gardens.

MORINDA (Rubiaceae)

M. citrifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 483).

Seed oil contained ricinoleic acid (6.8%) (*J. Oil Technol. Assoc. India* 1989, *21,* 26; *Chem. Abstr.* 1990, *113,* 148862 e); two new anthraquinones - morenone 1 and morenone 2 - isolated from roots and their structures elucidated (*Proc. Natl. Acad. Sci. India* 1992, *62*A, 11; *Chem. Abstr.* 1994, *121,* 175126 q); another anthraquinone from heartwood and its characterisation as physcion-8-O-[{α-L-arabinopyranosyl(1→3)}{β-D-galactopyranosyl(1→6)}-β-D-galactopyranoside] (*Int. J. Pharmacog.* 1993, *31,* 182; *Chem. Abstr.* 1994, *120,* 265759 g).
NEW COMPOUNDS



Morenone 1
R,R''' = H, R' = OH, R'',R'''' = OMe
Morenone 2
R,R'''' = OH, R',R'' = H, R''' = OMe

MORINGA (Moringaceae)

M. oleifera Lamk. syn. *M. pterygosperma* Gaertn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 484).

4-(α-L-Rhamnosyloxy)benzyl isothiocyanate and 4-(α-L-rhamnosyloxy)phenyl acetonitrile isolated from raw seeds (*Philipp. J. Sci.* 1990, *119,* 23; *Chem. Abstr.* 1992, *116,* 262345 a); mucilage named, drumstick polysaccharide (DSP), isolated from pods consisted of galactose, dextrose, xylose and sodium, potassium, magnesium and calcium salts of glucuronic acid (*Indian J. Pharm. Sci.* 1992, *54,* 28); new hypotensive thiocarbamates - niazinin A, niazinin B, niazimicin and an inseparable rotameric mixture of niaziminins A and B - isolated from leaves and characterised (*J. Chem. Soc.* Perkin 1 1992, 3237).

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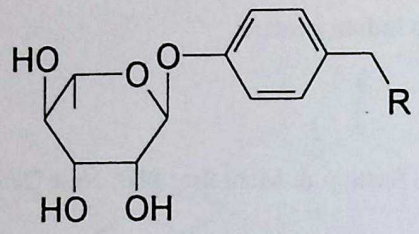
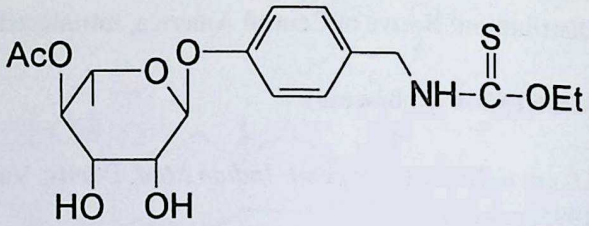
NEW COMPOUNDS





Niazinin A
R = (E)NHC(=S)OMe
Niazinin B
R = (Z)NHC(=S)OMe
Niazimicin
R = (E)NHC(=S)OEt

Niaziminins A + B

BIOLOGICAL ACTIVITY

4-(α-L-Rhamnosyloxy)benzyl isothiocyanate exhibited antibacterial activity against *Bacillus subtilis* but its aqueous-methanolic solution was inactive (*Philipp. J. Sci.* 1990, *119*, 23; *Chem. Abstr.* 1992, *116*, 262345 a).

M. pterygosperma Gaertn.; see *M. oleifera* Lamk.

MORUS (Moraceae)

M. alba L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 484).

Two new Diels-Alder type adducts - mulberrofuran T and kuwanol E - isolated from callus tissues and their stuctures determined (*Heterocycles* 1989, *29*, 2035); a new 2-arylbenzofuran - ω-hydroxymoracin N - isolated from leaves and its stucture determined; in addition, moracin C and moracin N isolated (*Agric. Biol.Chem.* 1991, *55*, 1409); C28 alkanes (11.04) and C30-34 alkanes (83.56%), β-amyrin, β-sitosterol, bergapten, scopoletin and umbelliferone isolated from leaves (*Fitoterapia* 1992, *63*, 92); isoquercitrin, quercetin-3-O-(6"-O-acetyl)-β-D-glucoside, astragalin and kaempferol-3-O-(6"-O-acetyl)-β-D-glucoside isolated from leaves (*Shoyakugaku Zasshi* 1993, *47*, 423; *Chem. Abstr.* 1994, *121*, 65388 u); eighteen N-containing sugars isolated from roots and characterised as 1-deoxynojirimycin, N-methyl-1-deoxynojirimycin, fagomine, 3-epifagomine, 1,4-dideoxy-1,4-imino-D-arabinitol, 1,4-dideoxy-1,4-imino-2-O-β-D-glucopyranosyl-D-arabinitol, 1,4-dideoxy-1,4-imino-D-ribitol, calystegin B2, calystegin C1, 2-O- and 6-O-α-D-galactosyl-1-deoxynojirimycins and 2-O-, 3-O-, 4-O- and 6-O-β-D-glucosyl-1-deoxynojirimycins (*Carbohydr. Res.* 1994, *259*, 243; *Chem. Abstr.* 1994, *121*, 104098 w).

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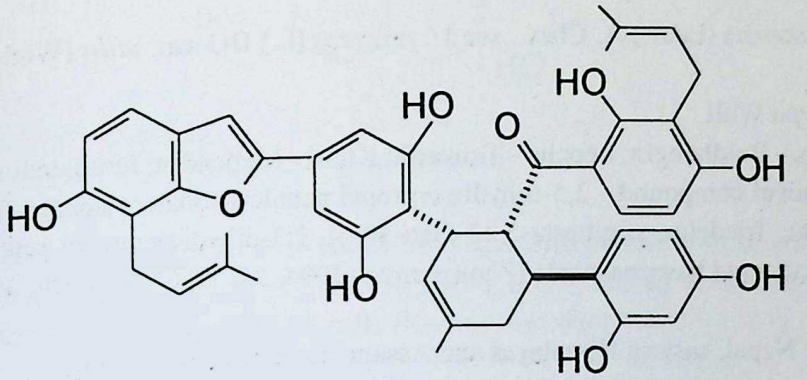
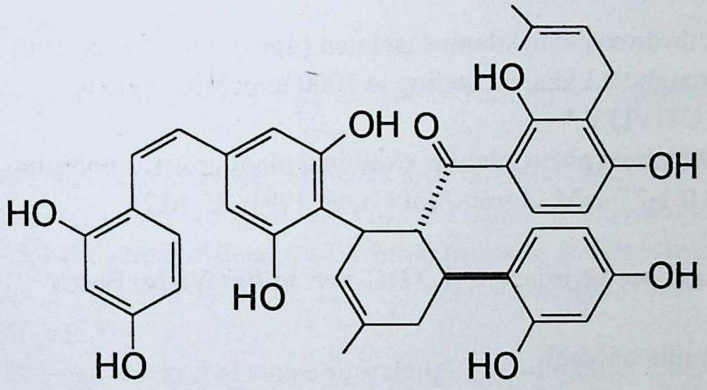
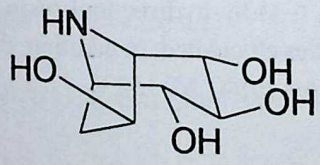
NEW COMPOUNDS



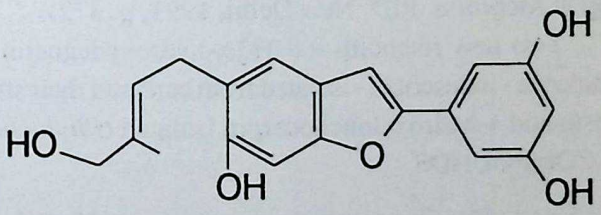
Mulberrofuran T



Kuwanol E



Calystegin C1



ω-Hydroxymoracin N

BIOLOGICAL ACTIVITY

Morusin inhibited activation of protein kinase C by teleocidin *in vitro* and pretreatment of mice skin with morusin for 10 min inhibited induction of ornithine decarboxylase by teleocidin, indicating that morusin inhibits tumor promotion by teleocidin. Morusin per se did not show any tumor-promoting activity in DMBA-initiated mouse skin (*Phytother. Res.* 1989, *3*, 193; *Chem. Abstr.* 1990, *112*, 16014 z); 3-O-(6"-O-acetyl)-β-D-glucosides of kaempferol and quercetin showed moderate inhibitory effects in water-insoluble glucan synthesis by glucosyl transferase (*Shoyakugaku Zasshi* 1993, *47*, 423; *Chem. Abstr.* 1994, *121*, 65388 u).

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MUCUNA (Papilionaceae)

M. cochinchinensis (Lour.) A. Chev.; see *M. pruriens* (L.) DC. var. *utilis* (Wight) Burck

M. macrocarpa Wall.

Nep. - Baldhengra; Lepcha - Tanyerik; Khasi - Meijendru, Jermijendru, Tharjendru.

A novel compound - 2,5-dihydroxypropyl pentacosanoate - isolated from stem along with lupenone, friedelin, stigmasta-5,22-dien-3β-ol, 2,3-dihydroxypropyl pentacosanoate and 2,3-dihydroxypropyl hexacosanoate (*Zhongcaoyao* 1994, *25*, 59; *Chem. Abstr.* 1994, *121*, 42514 t).

Distribution: Nepal, eastern Himalayas and Assam, ascending to 2000 m.

M. pruriens (L.) DC. var. *utilis* (Wight) Burck syn. *M. utilis* Wt. & Arn., *M. cochinchinensis* (Lour.) A. Chev.

(–)3,4-Dihydroxyphenylalanine isolated (*Agric. Biol. Chem.* 1991, *55*, 617).

Distribution: Throughout India, ascending to 1000 m in hilly regions.

BIOLOGICAL ACTIVITY

(–)3,4-Dihydroxyphenylalanine exhibited plant growth-inhibiting activity in different weeds with EC50 0.1-2.0 mM (*Agric. Biol Chem.* 1991, *55*, 617).

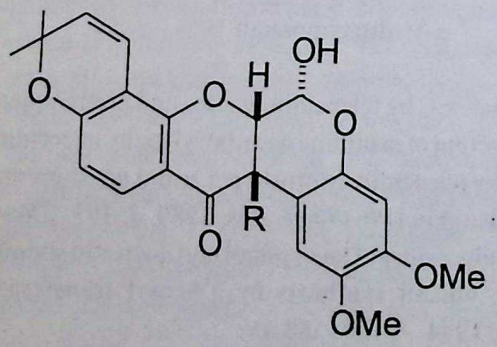
M. utilis Wt. & Arn.; see *M. pruriens* (L.) DC. var. *utilis* (Wight) Burck

MUNDULEA (Papilionaceae)

M. sericea (Willd.) A.Cheval syn. *M. suberosa* Benth. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 472).

Two new rotenoids - (–)13α-hydroxydeguelin and (–)13α-hydroxytephrosin - and a new chalcone - munsericin - isolated from bark and their structures elucidated; in addition, deguelin, tephrosin and 4-hydroxylonchocarpin isolated (*Phytochemistry* 1994, *36*, 1523).

NEW COMPOUNDS



(-)13α-Hydroxydeguelin
R = H
(-)13α-Hydroxytephrosin
R = OH

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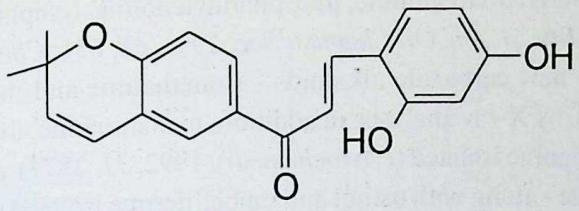

Munsericin

BIOLOGICAL ACTIVITY

(–)13α-Hydroxydeguelin, (–)13α-hydroxytephrosin, munsericin, deguelin, tephrosin and 4-hydroxylonchocarpin strongly inhibited phorbol ester-induced ornithine decarboxylase activity in cultured mouse 308 epidermal cells (*Phytochemistry* 1994, *36,* 1523).

M. suberosa Benth.; see *M. sericea* (Willd.) A. Cheval

MUNTINGIA (Elaeocarpaceae)

M. calabura L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 439).

Kaempferol, quercetin and their 3-O-galactosides, caffeic and ellagic acids identified in fresh leaves and flowers (*Fitoterapia* 1990, *61,* 374); chrysin, 2',4'-dihydroxychalcone, galangin 3,7-dimethyl ether, 5,7-dihydroxy-8-methoxyflavonol, tiliroside and buddlenoid A isolated from leaves and stems (*Int. J. Pharmacog.* 1993, *31,* 77; *Chem. Abstr.* 1993, *119,* 124958 p).

BIOLOGICAL ACTIVITY

Chrysin, 2',4'-dihydroxychalcone and galangin 3,7-dimethyl ether exhibited activity against a panel of human and murine cell lines (*Int. J. Pharmacog.* 1993, *31,* 77; *Chem. Abstr.* 1993, *119,* 124958 p).

MURRAYA (Rutaceae)

M. exotica L.; see *M. paniculata* (L.) Jack

M. koenigii (L.) Spreng. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 486).

Stem bark extract (1.0 g/kg) reduced carragenin-induced inflammation (~65.25%) in rats (*Proc. Natl. Acad. Sci. India* 1992, *62*A, 5; *Chem. Abstr.* 1994, *121,* 91440 z).

Isolation of a carbazole alkaloid - murrayazolinol - from stem bark and its structure determination (*J. Indian Chem. Soc.* 1989, *66,* 140); total synthesis of mukonine, murrayanine and koenoline (*Chem. Commun.* 1990, 664); total seed lipids (4.4%) contained neutral lipids (85.4), glycolipids (5.1) and phospholipids (9.5%); neutral lipids consisted of triacylglycerols (73.9), free fatty acids (10.2%) and small amount of diacylglycerols, monoacylglycerols and sterols; glycolipids contained steryl glucoside and acylated steryl glucoside; the phospholipids

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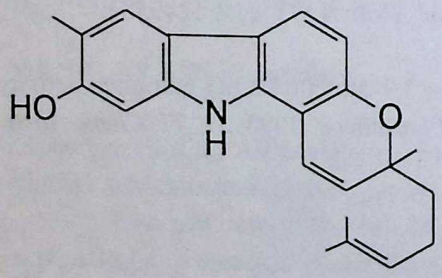
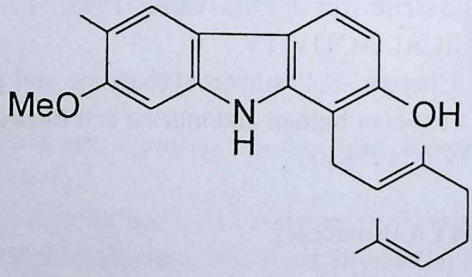
consisted of phosphatidylethanolamine, phosphatidylcholine, lysophosphatidylethanolamine and lysophosphatidylcholine (*J. Am. Oil Chemists Soc.* 1991, *68*, 651; *Chem. Abstr.* 1991, *115*, 228418 w); isolation of two new carbazole alkaloids - isomahanine and murrayanol - from fruits and their characterisation by X-ray analysis; in addition, mahanimbine, murrayazolidine, girinimbine, koenimbine and mahanine isolated (*Phytochemistry* 1992, *31*, 2877); a new coumarin - marmesin-1"-O-β-D-galactoside - along with osthol and umbelliferone isolated (*Proc. Natl. Acad. Sci. India* 1992, *62*A, 5; *Chem. Abstr.* 1994, *121*, 91440 z); three new monomeric carbazole alkaloids - mukoenines A, B and C - and five new monomeric carbazole alkaloids - murrastifoline F, bis-2-hydroxy-3-methylcarbazole, bismahanine, bikoeniquinone A and bismurrayaquinone A - isolated from roots and stems of plant grown in Shizuoka and their structures determined (*Chem. Pharm. Bull.* 1993, *41*, 2096); oil from leaves contained β-phellandrene (24.4), α-pinene (17.5), β-caryophyllene (7.3) and terpinen-4-ol (6.1%) (*J. Essent. Oil Res.* 1993, *5*, 371; *Chem. Abstr.* 1994, *121*, 153273 h); decahydrotetramethyl-cyclopropazulenol, selin-11-en-4α-ol and caryophyllene epoxide isolated from essential oil (*Fresenius J. Anal. Chem.* 1993, *347*, 286; *Chem. Abstr.* 1994, *120*, 330782 s); two carbazole alkaloids - girinimbilol and mahanimbilol - from stem bark and their characterisation (*Phytochemistry* 1994, *36*, 1073); two more new carbazole alkaloids isolated from stem bark and characterised as methyl 2-methoxycarbazole-3-carboxylate and 1-hydroxy-3-methylcarbazole (*Phytochemistry* 1994, *35*, 1085); 8-geranyloxypsoralen , imperatorin, heraclenin, isosaxalin, heraclenol, mahanimbine, girinimbine, koenimbin, isomahanine and mahanine isolated from seeds (*Planta Med.* 1994, *60*, 295).

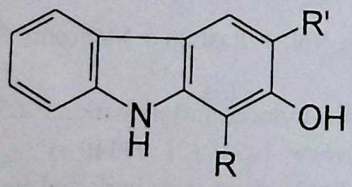
NEW COMPOUNDS



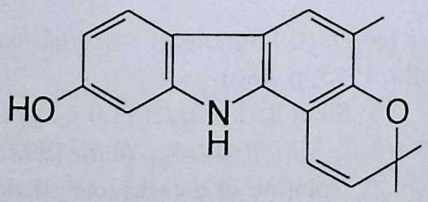
Isomahanine



Murrayanol



Mukoenine A
R = Prenyl, R' = Me
Mukoenine B
R = Geranyl, R' = CHO



Mukoenine C

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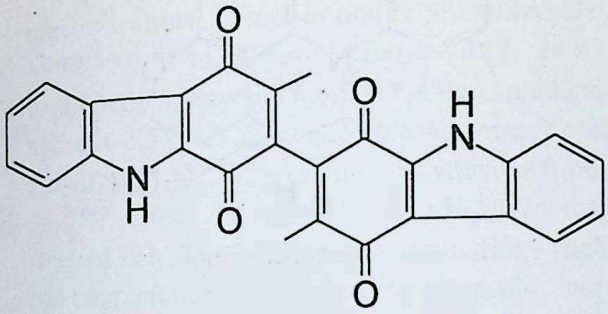
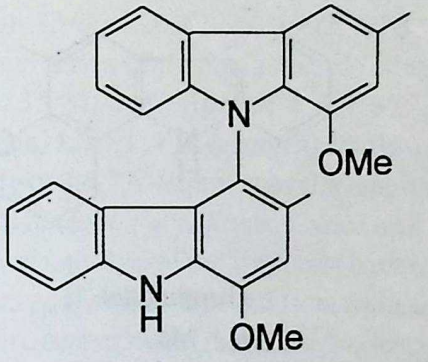
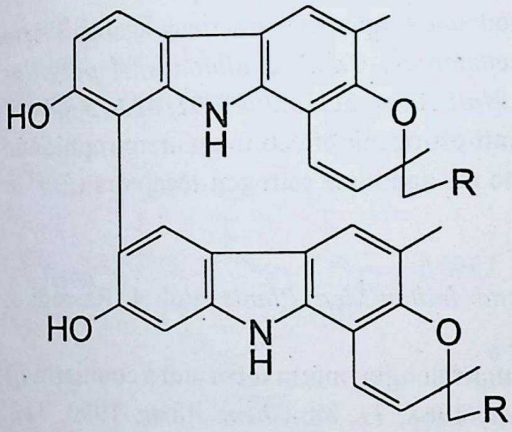


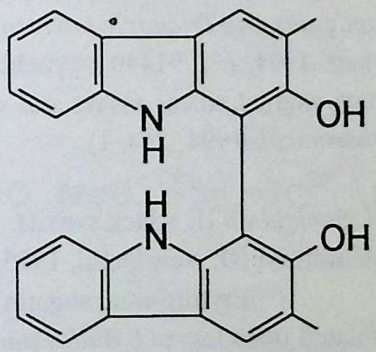
Bismurrayaquinone A



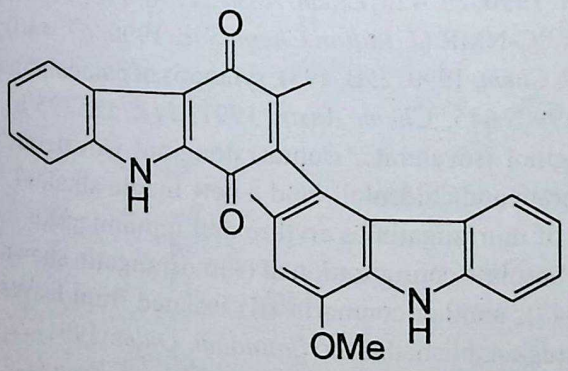
Murrastifoline F



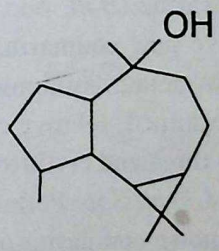
Bismahanine
R = Prenyl



Bis-2-hydroxy-3-methylcarbazole



Bikoeniquinone A



Decahydrotetramethyl-cyclopropazulenol

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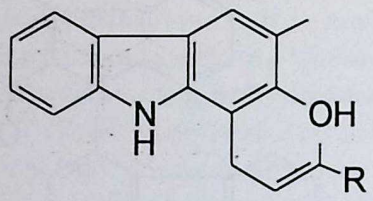
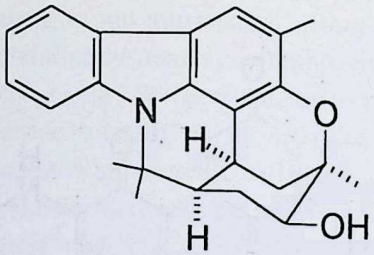


Girinimbilol
R = Me
Mahanimbilol
R = $(CH_2)_2CH{=}CMe_2$



Murrayazolinol

BIOLOGICAL ACTIVITY

Marmesin-1"-O-β-D-galactoside showed moderate to appreciable activity against *Vibrio cholerae, Salmonella typhimurium, Klebsiella pneumoniae, Candida albicans, Aspergillus fumigatus and Trichophyton mentagrophytes* (*Proc. Natl. Acad. Sci. India* 1992, *62*A, 5; *Chem. Abstr.* 1994, *121*, 91440 z); yuehchukene exhibited anti-estrogenic effects in rat uterotrophic and mice vaginal smear assays and was found to bind to rat and mice estrogen receptors (*Eur. J. Pharmacol.* 1994, *264*, 1).

M. paniculata (L.) Jack syn. *M. exotica* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 487).

(+)Erythro-murrangatin, (–)minumicrolin, murralongin, murraxocin and a coumarin (I) isolated from leaves (*Bull. Pharm. Sci., Assiut Univ.* 1988, *11*, 88; *Chem. Abstr.* 1990, *112*, 69484 j); osthol, aurapten, lupeol, 3-epi-cyclolaudenol and cis-nerolidol isolated from leaves (*Bull. Pharm. Sci., Assiut Univ.* 1988, *11*, 105; *Chem. Abstr.* 1990, *112*, 30295 y); absolute configuration of natural paniculidines A and B established as R by synthesis of S-enantiomer (*J. Chem. Soc.* Perkin 1 1989, 1353; *Zh. Org. Khim.* 1990, *26*, 425; *Chem. Abstr.* 1990, *113*, 115628 e); isolation of murralongin from leaves and its ^{13}C-NMR (*J. Indian Chem. Soc.* 1990, *67*, 440); isolation and 2D-NMR of aurantiamide (*Indian J. Chem.* 1990, *29*B, 495); synthesis of paniculidine A and murrayacarine (*Bull. Soc. Chim. Fr.* 1990, 645; *Chem. Abstr.* 1991, *114*, 185795 b); structures of five new coumarins - murralonginol isovalerate, isomurralonginol isovalerate, murrangatin isovalerate, minumicrolin isovalerate and chloculol - and a new indole alkaloid - paniculol - determined; relative configuration of murrangatin as erythro and minumicrolin as threo revised to threo and erythro respectively; absolute configuration of (–)murrangatin shown to be (R,R) (*J. Chem. Soc.* Perkin 1 1990, 2047); another coumarin (II) isolated from leaves together with known coumarins and its structures established (*Rev. Latinoam. Quim.* 1991, *22*, 38; *Chem. Abstr.* 1992, *116*, 148161 n, 211110 n); synthesis of yuehchukene (*Tetrahedron Lett.* 1991, *32*, 1045; *Tetrahedron* 1992, *48*, 759); two new dimeric carbazole alkaloids - bis-7-hydroxygirinimbine A and bis-7-methoxygirinimbine A - isolated from plant cultivated in Egypt

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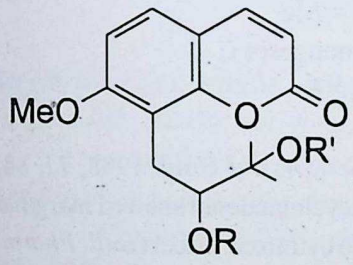
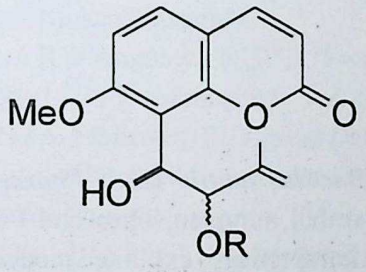
and their structures determined (*Bull. Fac. Pharm.*, Cairo Univ. 1992, *30*, 231; *Chem. Abstr.* 1993, *119*, 177557 p); flowers afforded scopoletin (*Indian J. Chem.* 1992, *31*B, 133); murrayacanine, koenoline and koenimbine isolated from leaves (*Bull. Fac. Pharm.*, Cairo Univ. 1992, *30*, 235; *Chem. Abstr.* 1993, *119*, 156235 s); isolation of 5,6,7,8,3',4',5'-heptamethoxyflavone, 5,6,7,8,3',4'-hexamethoxyflavone, 5,6,8,3',4',5'-hexamethoxyflavone, 4-hydroxy-3,5,6,7,3',5'-hexamethoxyflavone, 3',5'-dihydroxy-3,6,7,4'-tetramethoxyflavone and 4,5-dihydroxy-3,6,7,3',5'-pentamethoxyflavone from root bark (*Bull. Fac. Pharm.*, Cairo Univ. 1992, *30*, 287; *Chem. Abstr.* 1993, *119*, 156240 q); isolation of murrayazolinol from root bark (*Indian Drugs* 1994, *31*, 32); three new coumarins - yuehgesins A, B and C - isolated from fresh flowers and characterised; in addition murracarpin, mupanidin, isomeranzin, murralongin, scopoletin, umbelliferone, paniculatin, broylin auraptenol, meranzin hydrate, minumicrolin, scopolin, caffeine, 4-hydroxybenzaldehyde, p-hydroxybenzoic acid, cis- and trans-ferulic acids, cis- and trans-methyl ferulate, trans-ethyl ferulate, 7-methoxy-8(1'-ethoxy-2'-hydroxy-3'-methyl-3'-butenyl)coumarin and 3,5,6,7,3',4',5'-heptamethoxyflavone also isolated (*J. Chin. Chem. Soc.* 1994, *41*, 213; *Chem. Abstr.* 1994, *121*, 5109 u).

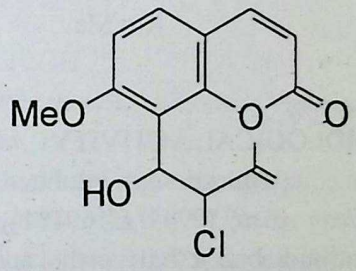
NEW COMPOUNDS



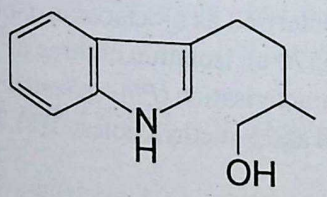
I
R = H, R' = Et
II
R = Et, R' = H



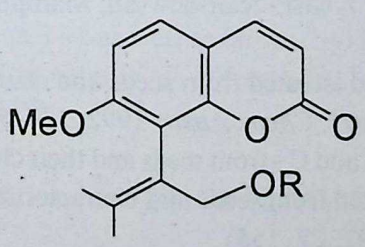
Murrangatin
R = H, ~ = β
Minumicrolin isovalerate
R = Isovaleryl, ~ = α



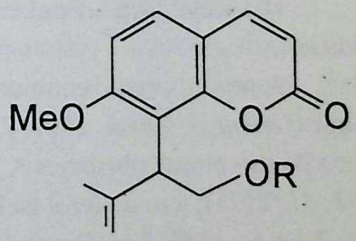
Chloculol



Paniculol



Murralonginol isovalerate
R = Isovaleryl



Isomurranginol isovalerate
R = Isovaleryl

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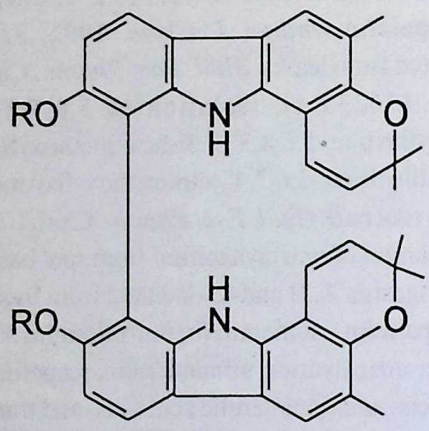

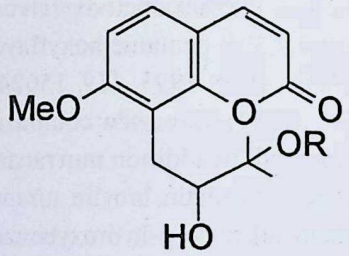

Bis-7-hydroxygirinimbine A
R = H
Bis-7-methoxygirinimbine A
R = Me

Yuehgesin A
R = $C(Me_2)OH$
Yuehgesin B
R = Me
Yuehgesin C
R = Et

BIOLOGICAL ACTIVITY

Murralongin inhibited *Bacillus subtilis* (*Bull. Pharm. Sci., Assiut Univ.* 1988, *11*, 88; *Chem. Abstr.* 1990, *112*, 69484 j); osthol, aurapten, lupeol and 3-epicyclolaudenol showed marginal antimicrobial activity; osthol and aurapten also exhibited moderate cytotoxic effect (*Bull. Pharm. Sci., Assiut Univ.* 1988, *11*, 105; *Chem. Abstr.* 1990, *112*, 30295 y).

MUSA (Musaceae)

M. balbisiana Colla syn. *M. sapientum* sensu Hook.f., p.p. (non L.)

H. - Kela; Nep. - Bonkera; Khasi - Kait-dewsan; Manipur - Chungbi anguoba; Assam - Athia kol.

A new aliphatic compound isolated from seeds and characterised as n-octacosan-1-ol-22-one (*Orient. J. Chem.* 1991, *7*, 167; *Chem. Abstr.* 1992, *116*, 55570 e); isolation of three new diterpenoids - musabalbisianes A, B and C - from seeds and their characterisation (*Phytochemistry* 1992, *31*, 2173); a new sterol isolated from seeds and characterised as 25-methylcholest-1(2),7-dien-3-on-5α-ol (*Indian Drugs* 1992, *29*, 155).

Distribution: Cultivated throughout India and Nepal.

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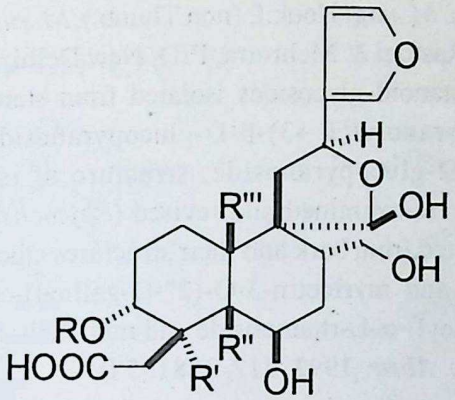
NEW COMPOUNDS



Musabalbisiane A
R = H, R' = COOH, R'',R''' = CHO
Musabalbisiane B
R = H, R' = CHO, R'' = COOH, R''' = CH_2OH
Musabalbisiane C
R = Angeloyl, R',R'',R''' = CH_2OH

M. paradisiaca L. syn. *M. sapientum* L., *M. paradisiaca* L. var. *sapientum* (L.) Kuntze (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 489).

Stem juice (3.0 ml/rat/day, orally) exhibited antilithiatic activity, reducing formation of and dissolving already-formed stones (*Indian J. Physiol. Pharmacol.* 1993, *37,* 337).

A mannoside-binding lectin - Ban Lec-1 - isolated and characterised (*Biochem. J.* 1990, *272,* 271; *Chem. Abstr.* 1991, *114,* 21000 n); four new flavanols - (–)(2S,3S,4R)2,3-cis-3,4-trans-7,4'-dihydroxyflavan-3,4-diol, (–)(2S,3R,4R)2,3-trans-3,4-cis-7,4'-dihydroxyflavan-3,4-diol, (–)(2S,3R,4R)2,3-trans-3,4-cis-4'-hydroxyflavan-3,4-diol and (–)(2S,3S, 4R)2,3-cis-3,4-trans-5,7,4'-trihydroxyflavan-3,4-diol isolated from defatted seeds and their structures elucidated (*Pharmazie* 1993, *48,* 455; *Chem. Abstr.* 1993, *119,* 135661 n); acetate, butanoate, 3-methylbutanoate and pentanoate esters of hex-4(Z)-en-1-ol, hept-4(Z)-en-2-ol, oct-4(Z)-en-1-ol, oct-5(Z)-en-1-ol and dec-4(Z)-en-1-ol as well as hexan-2-yl butanoate, 3-methyl butanoate and 3-methyl pentanoate identified in volatile oil of fruits (*J. Agric. Food Chem.* 1993, *41,* 2056; *Chem. Abstr.* 1993, *119,* 248511 g).

M. paradisiaca L. var. *sapientum* (L.) Kuntze; see *M. paradisiaca* L.

M. sapientum L.; see *M. paradisiaca* L.

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MYRICA (Myricaceae)

M. esculenta Buch.-Ham. syn. *M. nagi* Hook.f. (non Thunb.), *M. rubra* Sieb. & Zucc. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 490).

Two new diarylheptanoid glycosides isolated from stem bark and characterised as myricanol-5-O-β-D-glucopyranosyl(1→3)-β-D-glucopyranoside and myricanol-5-O-α-L-arabinofuranosyl(1→6)-β-D-glucopyranoside; structure of isomyricanone, obtained by isomerisation of myricanone, re-examined and revised (*Phytochemistry* 1991, *30,* 3077); two new flavonol glycosides isolated from bark and their structures elucidated as myricetin-3-O-(3"-O-galloyl)-α-L-rhamnoside and myricetin-3-O-(2"-O-galloyl)-α-L-galactoside; in addition myricetin, its 3-O-(2"-O-galloyl)-α-L-rhamnoside and myricitrin isolated (*Linchan Huaxue Yu Gongye* 1991, *11,* 251; *Chem. Abstr.* 1992, *117,* 128155 f).

M. nagi Thunb.; see *M. esculenta* Buch.-Ham.

M. rubra Sieb. & Zucc.; see *M. esculenta* Buch.-Ham.

MYRISTICA (Myristicaceae)

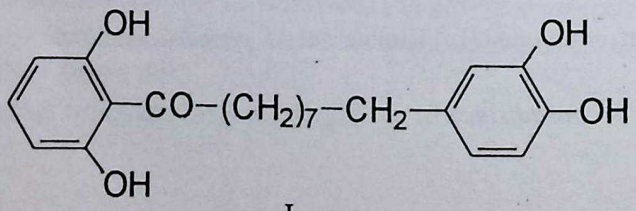
M. amygdalina Wall.; see *Horsfieldia amygdalina* (Wall.) Warb.

M. fragrans Houtt. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 492).

Administration of plant extract i.p. to sarcoma 180-bearing mice prolonged their lifespan from 19 days in controls to 24-32 days (Jpn. 1,42,440 (1989) Feb. 14; *Chem. Abstr.* 1990, *112,* 91779 f).

An active principle (I) isolated from plant extract (Jpn. 1,42,440 (1989) Feb. 14; *Chem. Abstr.* 1990, *112,* 91779 f); seeds contained ~ 0.24% myristicin whereas volatile oil contained ~3.12% (*Zhongguo Zhongyao Zazhi* 1990, *15,* 471; *Chem. Abstr.* 1990, *113,* 229887 u); crystal structure of licarin B (*Arch. Pharmacal Res.* 1991, *14,* 1; *Chem. Abstr.* 1991, *115,* 131990 p); antimicrobial resorcinols, malabaricones B and C isolated from seed coates and their structures established (*J. Nat. Prod.* 1991, *54,* 856); phenylpropyl derivatives (II) isolated from pulverised mace as neoplasm inhibitors (Jpn, 3,287,527 (1991) Apr. 04; *Chem. Abstr.* 1992, *116,* 158899 y).

NEW COMPOUNDS



I

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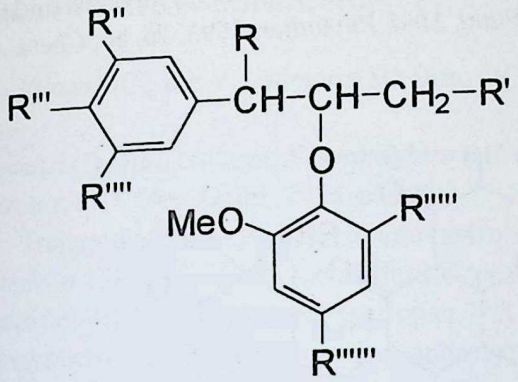

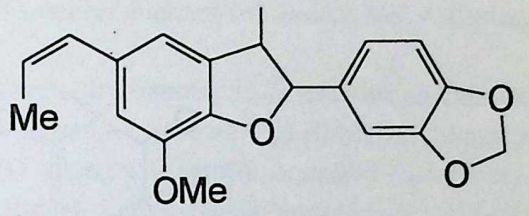

II

Licarin B

R,R',R'',R''',R'''',R''''' = H/OH/OMe,
R'''''' = $CH_2CH=CH_2$/CH=CHMe

BIOLOGICAL ACTIVITY

A single dose of myristicin, licarin B, dehydrodiisoeugenol or 2-(4-allyl-2,6-dimethoxyphenyl)-1,4-hydroxy-3-methoxyphenylpropan-1-ol, constituents of seeds, to mice prolonged hexobarbital-induced sleep and reduced liver aminopyrine N-demethylase and hexabarbital hydrolase activities. Repeated administration of myristicin, licarin B and dehydrodiisoeugenol shortened duration of hypnosis and increased hepatic enzyme activities. Myristicin and licarin B induced sleep with a subhypnotic dose of hexabarbital suggesting that they possessed central nervous depressant properties (*Han'guk Saenghawa Hak Hoe Chi* 1990, *23,* 122; *Chem. Abstr.* 1990, *113,* 91283 k); malabaricones B and C exhibited strong antifungal and antibacterial activities (*J. Nat. Prod.* 1991, *54,* 856).

MYRSINE (Myrsinaceae)

M. africana L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 495).

A new 1,4-benzoquinone derivative - myrsinone - isolated from Kenyan plant and its structure determined as 2,3-dihydroxy-5-undecyl-1,4-benzoquinone (*Bull. Chem. Soc. Ethiop.* 1992, *6,* 15; *Chem. Abstr.* 1993, *118,* 19211 w).

MYRTUS (Myrtaceae)

M. communis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 498).

Isolation of two new acylphloroglucinols - myrtucommulones C and D - from leaves and their structure determination (*Izv. Timiryazevsk. S-Kh. Akad.* 1989, 164; *Chem. Abstr.* 1990, *112,* 195230 m); delphinidin, petunidin, malvidin, peonidin, cyanidin-3-mono- and -3,5-

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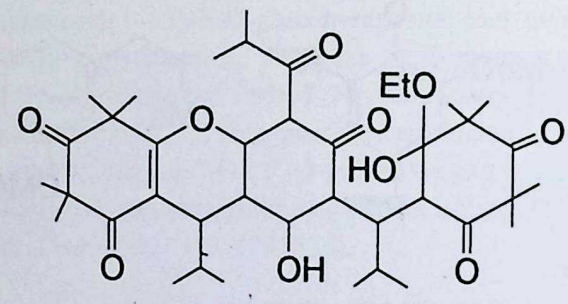
diglucosides identified in barries (*Fitoterapia* 1990, *61*, 85); myricetin-3β-D-(6"-galloylgalactoside).isolated from leaves (*Plant. Med. Phytother.* 1993, *26*, 86; *Chem. Abstr.* 19 *120*, 73476 r).

NEW COMPOUNDS



Myrtucommulone C

NANDINA (Nandinaceae)

N. domestica Thunb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, Nev Delhi, 1995, p. 496).

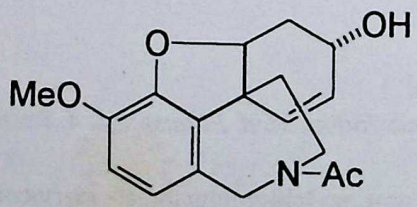
Crystal structure of nantenine determined (*Acta Crystallogr., Cryst. Struct. Commun* 1991, *47*C, 2500; *Chem. Abstr.* 1992, *116*, 59681 q).

NARCISSUS (Amaryllidaceae)

N. tazetta L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993 p. 444).

Homolycorine, lycorine and tazettine isolated from Egyptian plant (*Alexandria J. Pharm. Sci.* 1989, *3*, 122; *Chem. Abstr.* 1990, *112*, 95556 d); isolation and structure elucidation of narcisin from bulbs; lycorine, pseudolycorine, galanthine, haemanthamine, tazettine and pretazettine als isolated (*Phytochemistry* 1993, *34*, 1447); Egyptian plant afforded 9-O-demethylhomolycorin whose structure determined (*Arch. Pharm.* 1994, *327*, 595; *Chem. Abstr.* 1994, *121*, 200918 j)

NEW COMPOUNDS



Narcisine

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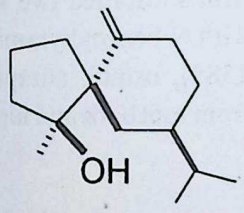
NARDOSTACHYS (Valerianaceae)

N. grandiflora DC.; see *N. jatamansi* (D.Don) DC.

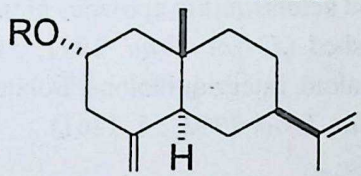
N. jatamansi (D.Don) DC. syn. *N. grandiflora* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 497).

Isolation of a new sesquiterpenoid - spirojatamol - from roots and its structure elucidation (*Tetrahedron* 1990, *46,* 1523); roots afforded a new lignan - erythro-1-(3,4-dimethoxyphenyl)-2-(2-methoxy-4(E)propenylphenoxy)-propan-1-ol (I) - along with virolin, erythro-1-(4-hydroxy-3-methoxyphenyl)-2-(2-methoxy-4(E)-propenylphenoxy)-propan-1-ol, (+)pinoresinol and (+)1-hydroxypinoresinol (*Planta Med.* 1991, *57,* 96); two new eudesmanes - jatamol A and jatamol B - isolated from roots and their structures determined (*Planta Med.* 1991, *57,* 282).

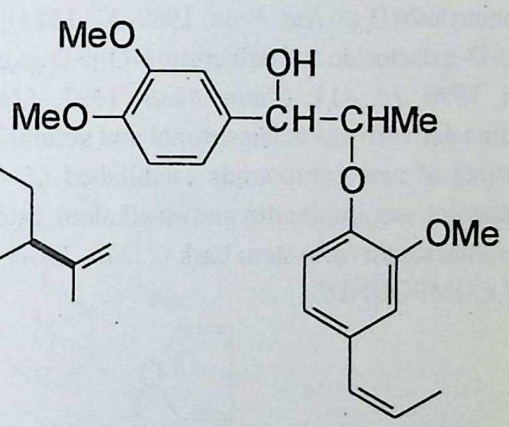
NEW COMPOUNDS



Spirojatamol



Jatamol A
R = H
Jatamol B
R = $COCH_2CMe_2OH$



I

Note : *Nardostachys grandifolia* DC., was kept as syn. under *N. jatamansi* (D.Don) DC. in earlier Compendium Volumes (*3*, p. 445; *4*, p. 498). Recently these have been fixed as two distinct species (Ethnobotany 1989, *1*, 67).

NARINGI (Rutaceae)

N. alata (Wall. ex Wt. & Arn.) Ellis syn. *Limonia alata* Wall. ex Wt. & Arn., *Pleiospermium alatum* (Wall. ex Wt. & Arn.) Swingle (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 498).

Two new acridones - 1,5,6-trihydroxy-2,3-dimethoxy-10-methyl-9-acridone and 1-hydroxy-2,3,5,6-tetramethoxy-10-methyl-9-acridone - isolated from root bark together with lupeol and stigmasterol (*Phytochemistry* 1990, *29,* 297); root bark of plant from Sri Lanka afforded apiosylskimmin, 1-(10→19)-abeo-7α-acetoxy-10β-hydroxyisoobacunoic acid-3,10-lactone and 7α-limonyl acetate (*J. Nat. Prod.* 1992, *55,* 1261).

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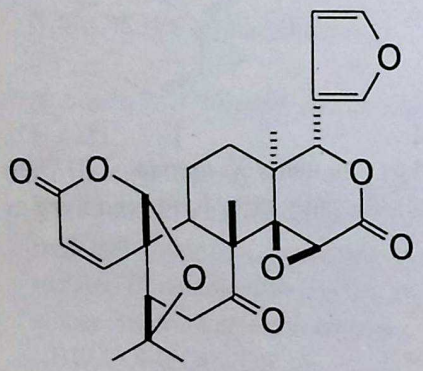
N. crenulata (Roxb.) Nicolson syn. *Limonia crenulata* Roxb., *L. acidissima* auct. (non. L.), *Hesperethusa crenulata* (Roxb.) M.Roem. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 498).

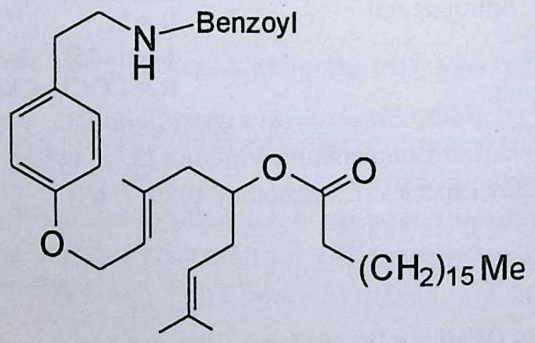
Plant extract exhibited anti-inflammatory activity (*Indian J. Pharm. Sci.* 1989, *51,* 32).

Isolation and structure elucidation of 8-hydroxy-6-methoxy-2-methylanthraquinone-3-O-β-D-glucoside and umbelliferone-7-O-α-L-rhamnosyl(1→6)-β-D-glucoside; β-sitosterol and α-amyrin also isolated (*Indian J. Pharm. Sci.* 1989, *51,* 32); detection of β-pinene, 1,8-cineole and geraniol in leaf oil (*Indian Perfum.* 1989, *33,* 238; *Chem. Abstr.* 1990, *113,* 177989 g); stem bark afforded bergapten and psoralen (*J. Natl. Sci. Counc. Sri Lanka* 1989, *17,* 237; *Chem. Abstr.* 1991, *115,* 252105 n; *J. Nat. Prod.* 1992, *55,* 1261); a new limonoid - acidissimin - isolated from root bark whereas stem bark afforded obacunone, structure of new limonoid determined (*J. Nat. Prod.* 1989, *52,* 882); fruits contained a new tyramine derivative - acidissimin* - which was characterised as benzamide-N-{p-[3,7-dimethyl-4-octadecanoyloxy-2,6-octadienyl)-oxy]phenylethyl} (*J. Nat. Prod.* 1989, *52,* 1323); 1-hydroxy-6-methoxy-3-methylanthraquinone-8-O-β-D-galactoside and dalbergin-6-O-β-D-galactoside isolated from leaves (*Acta Cienc. Indica, Chem.* 1990, *16,* 411; *Chem. Abstr.* 1992, *116,* 170107 w); further, fruits afforded two new tyramine derivatives - acidissiminol and acidissiminin epoxide - along with N-benzoyltyramine; structures of new compounds established (*J. Nat. Prod.* 1991, *54,* 1389); osthol, aurapten, stigmasterol, isopimpinellin and an alkaloid, integriquinolone, isolated from root bark and lupeol and (+)marmesin from stem bark (*J. Nat. Prod.* 1992, *55,* 1261).

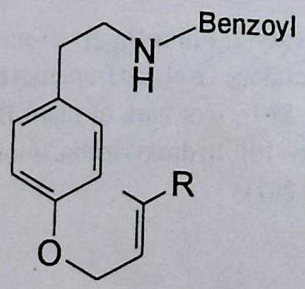
NEW COMPOUNDS



Acidissimin



Acidissimin*



Acidissiminol
R = $CH(OH)CH_2CH{=}CMe_2$
Acidissiminin epoxide
R = $CH{-}CH_2{-}CH{-}CMe_2$ (O; $O.CO(CH_2)_{16}Me$)

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BIOLOGICAL ACTIVITY

Umbelliferone-7-O-α-L-rhamnosyl(1→6)-β-D-glucoside exhibited anti-inflammatory activity (*Indian J. Pharm. Sci.* 1989, *51*, 32); bergapten showed insecticidal activity against *Callosobruchus chinensis*, whereas psoralen was inactive (*J. Natl. Sci. Counc. Sri Lanka* 1989, *17*, 237; *Chem. Abstr.* 1991, *115*, 252105 n).

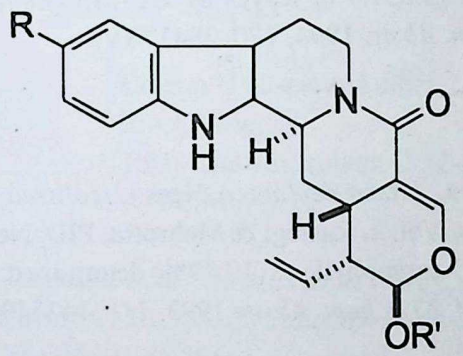
Note : Trivial name acidissimin has been assigned to two different constituents.

NAUCLEA (Rubiaceae)

N. orientalis (L.) L. syn. *Sarcocephalus cordatus* Miq. (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 287).

Two new alkaloids - 10-hydroxystrictosamide and 6'-O-acetylstrictosamide - isolated from leaves and their structures established; strictosamide and vincosamide also isolated (*Planta Med.* 1991, *57*, 149).

NEW COMPOUNDS



10-Hydroxystrictosamide
R = OH, R' = Glu
6'-O-Acetylstrictosamide
R = H, R' = Glu(6-Ac)

NEISOSPERMA (Apocynaceae)

N. oppositifolium (Lamk.) Fosb. & Sach. syn. *Ochrosia borbonica* sensu Hook.f. (non J.F. Gmel.), *O. oppositifolia* (Lamk.) K.Schum. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 499).

Chiral synthesis of ochropposinine (*Chem. Pharm. Bull.* 1990, *38*, 1200).

NELUMBIUM (Nymphaeaceae)

N. nuciferum Gaertn.; see *Nelumbo nucifera* Gaertn.

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N. speciosum Willd.; see *Nelumbo nucifera* Gaertn.

NELUMBO (Nymphaeaceae)

N. nucifera Gaertn. syn. *Nelumbium speciosum* Willd., *N. nuciferum* Gaertn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 499).

Acetone extract of seeds showed antimutagenic activity against some common mutagens (MNNG, aflatoxin B1, NaN3 and 2-aminofluorene) in Ames test (*Salmonella typhimurium* strains TA98 and TA100). Extract decreased mutagenic activity of aflatoxin B1 by 82.5% (*Zhonghua Yufang Yixue Zazhi* 1989, *23,* 160; *Chem. Abstr.* 1990, *112,* 53926 u).

Hydrocarbon content of flower was 75.0%; 1,4-dimethoxybenzene, 1,8-cineole, terpinen-4-ol and linalool identified in flowers (*J. Essent. Oil Res.* 1991, *3,* 221; *Chem. Abstr.* 1992, *116,* 37932 v); a polysaccharide isolated from seeds consisted of arabinose, galactose, mannose and glucose in molar ratio of 3.0:3.9:1.0:2.1 respectively (*Carbohydr. Res.* 1992, *224,* 331; *Chem. Abstr.* 1992, *116,* 148296 k); determination of cis-3-hexenol (40.41), diphenylamine (8.35), α-longifolene (5.6) and hexanol (3.65%) in leaves by GC-MS (*Beijing Daxue Xuebao, Ziran Kexueban* 1992, *28,* 699; *Chem. Abstr.* 1994, *120,* 294176 v).

NEOLITSEA (Lauraceae)

N. cassia (L.) Kostermans syn. *Litsea zeylanica* Nees, *Neolitsea zeylanica* (Nees) Merrill (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 482).

Linalool (54.91) and β-caryophyllene (17.42%) determined in leaf essential oil by GC-MS (*J. Essent. Oil Res.* 1992, *4,* 87; *Chem. Abstr.* 1993, *118,* 143510 g).

N. chinensis (Lam.) Chun syn. *Litsea chinensis* Lam., *L. glutinosa* (Lour.) C.B. Robins, *L. sebifera* Pers. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 446).

A water-soluble mucilage containing arabinose and xylose in molar ratio of 3.4:1.0 isolated from bark and partially characterised (*Carbohydr. Res.* 1990, *198,* 343; *Chem. Abstr.* 1990, *113,* 20861 m).

N. zeylanica (Nees) Merrill; see *N. cassia* (L.) Kostermans

NEPETA (Lamiaceae)

N. cataria L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 499).

Isolation of 4aα,7α,7aα-nepetalactone, 4aα,7α,7aβ-nepetalactone, 3,4β-dihydro-4aα,7α,7aα-nepetalactone, β-caryophyllene, 3,7-dimethyl-1-oxabicyclo-[3,3,0]oct-2-ene,

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piperitone, thymol methyl ether, hexenyl benzoate and humulene oxide from flowering plant (*J. Essent. Oil Res.* 1993, *5*, 159; *Chem. Abstr.* 1993, *119*, 124975 s).

N. elliptica (Royle ex Benth.) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 500).

Coleon U 12-methyl ether and 15,16-dehydrocoleon U 12-methyl ether isolated and characterised (*Phytochemistry* 1993, *34*, 1438).

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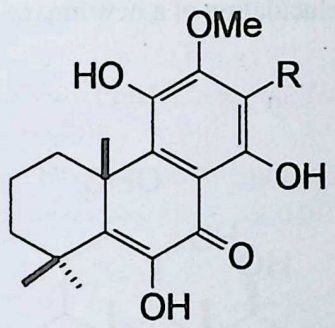

Coleon U 12-methyl ether
R = $CHMe_2$
15,16-Dehydrocoleon U 12-methyl ether
R = $C(Me)=CH_2$

N. eriostachya Benth.

A new triterpene - nepetoic acid - isolated as its methyl ester and characterised; 2α,3α-dihydroxyurs-12-en-28-oic acid and 2α,3β-dihydroxyurs-12-en-28-oic acid also isolated as their methyl esters (*Phytochemistry* 1990, *29*, 3956).

Distribution: Western Himalayas from Kashmir to Garhwal, alt. 2500-3600 m.

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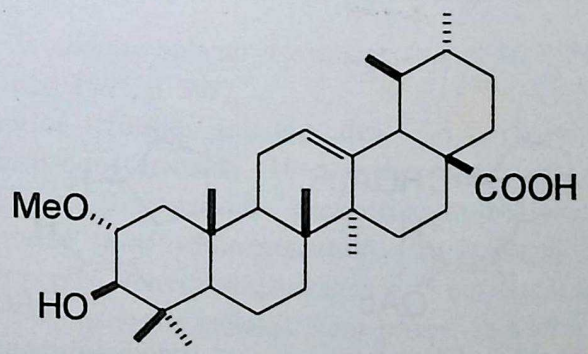

Nepetoic acid

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N. govaniana Benth.

Determination of pregeijerene (38.0), iridolactone (14.0), geijerene (6.8) and nepetalactone (4.8%) by GC-MS in essential oil from aerial parts of plant grown in Himalayan region (*J. Essent. Oil Res.* 1994, *6*, 425; *Chem. Abstr.* 1994, *121*, 141187 v).

Distribution: Himalayas, from Kashmir to Kumaon, alt. 2400-3300 m.

N. hindostana (Roth) Haines syn. *N. ruderalis* Buch.-Ham. ex Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 500).

Isolation and structure elucidation of a new lupane aldehyde - nepehinal (*Planta Med.* 1993, *59*, 366).

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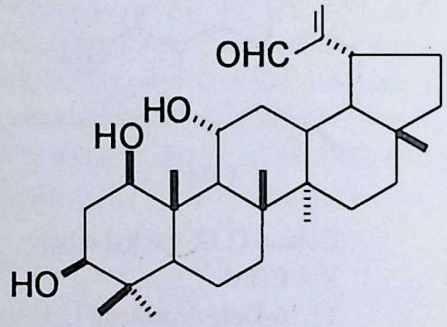

Nepehinal

N. leucophylla Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 501).

Coleon U 12-methyl ether isolated from roots and its absolute configuration determined (*J. Nat. Prod.* 1991, *54*, 910); isolation of three iridodial derivatives - iridodial-β-monoenol acetate, dihydroiridodial-β-enol diacetate and iridodialdienol diacetate - from essential oil of plant from Kumaon region (*Phytochemistry* 1992, *31*, 1653); aerial parts contained caryophyllene oxide, β-sitosterol, oleanolic acid, ursolic acid and ethyl dodecanoate (*J. Indian Chem. Soc.* 1993, *70*, 783).

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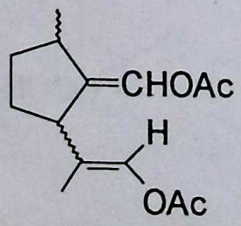
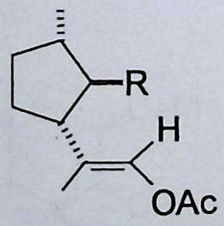


Iridodialdienol diacetate



Iridodial-β-monoenol acetate
R = CHO
Dihydroiridodial-β-enol diacetate
R = CH_2OAc

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N. ruderalis Buch.-Ham. ex Benth.; see *N. hindostana* (Roth) Haines

NEPHELIUM (Sapindaceae)

N. litchi Camb.; see *Litchi chinensis* (Gaertn.) Sonner

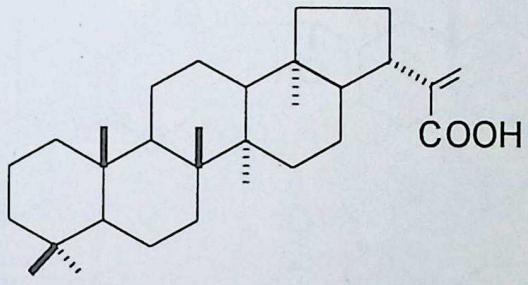
N. longana (Lamk.) Camb.; see *Euphoria longan* (Lour.) Steud.

NEPHROLEPIS (Nephrolepidaceae)

N. cordifolia (L.) Presl syn. *N. tuberosa* Presl (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 501).

A new hopane derivative - tuberosic acid - isolated along with 22(S)-hopan-30-oic acid and its structure established (*Phytochemistry* 1993, *33,* 240).

NEW COMPOUNDS -



Tuberosic acid

N. tuberosa Presl; see *N. cordifolia* (L.) Presl

NERIUM (Apocynaceae)

N. indicum Mill. syn. *N. odorum* Soland. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 502).

New cardenolide triolides and biosides - adynerigenin-β-odorotrioside, 16-dehydroadynerigenin-β-odorotrioside, 16-dehydroadynerigenin-β-gentiobiosyl-β-D-sarmentoside, oleandrigenin-β-neritrioside, oleandrigenin-β-D-glucosyl-β-D-sarmentoside, digitoxigenin-β-oleatrioside, 16-dehydroneragenin-β-neritrioside, 8β-hydroxydigitoxigenin-β-neritrioside, 8β-hydroxy-16-dehydrodigitoxigenin-β-neritrioside and 8β-hydroxy-16-dehydrodigitoxigenin-β-odorobioside isolated from leaves; in addition, known triosides and biosides, oleandrigenin-α-oleatrioside, -β-odorotrioside, -α-oleabioside, -β-neribioside and -β-D-glucoside, 16-dehydrodigitoxigenin-β-neritrioside and -β-odorotrioside, gitoxigenin-α-oleatrioside, digitoxigenin-β-neritrioside and -β-odorotrioside (odoroside G), neriagenin-β-neritrioside, adynerigenin-β-neritrioside, 16-dehydroadynerigenin-β-neritrioside, -β-neribioside

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and -β-odorobioside also isolated (*Phytochemistry* 1992, *31*, 2459); two pregnane glycosides - 3-O-β-gentiobiosyl-3β,14β-dihydroxy-5α-pregnan-20-one (I) and 21-O-β-D-glucosyl-14β,21-dihydroxypregn-4-en-3,20-dione (II) - isolated from leaves and their structures established (*Phytochemistry* 1992, *31*, 2819); isolation of six cardenolide glycosides - digitoxigenin-β-gentiotriosyl(1→4)-β-D-digitaloside, uzarigenin-β-gentiobiosyl(1→4)-β-D-digitaloside, 5α-oleandrigenin, its β-D-digitaloside, β-D-glucosyl(1→4)-β-D-diginoside and β-D-glucosyl(1→4)-β-D-digitaloside - and two pregnanolone glycosides - 5α-pregnanolone-O-β-D-glucosyl[(2→1)-β-D-glucosyl](6→1)-β-D-glucoside (III) and pregnenolone-β-D-apiosyl(1→6)-β-D-glucoside (IV) - from roots (*Phytochemistry* 1992, *31*, 3183).

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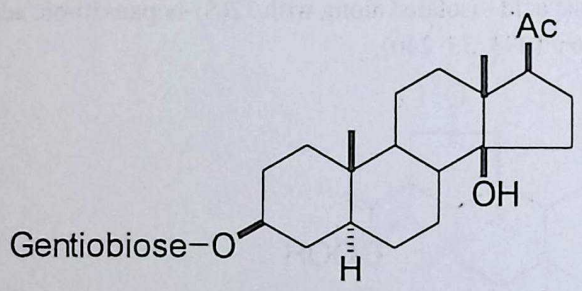

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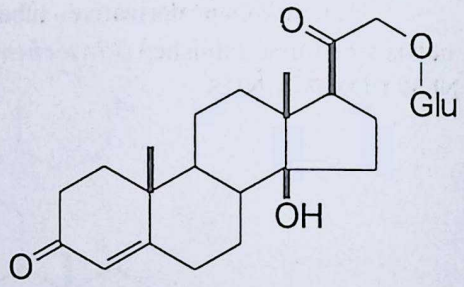

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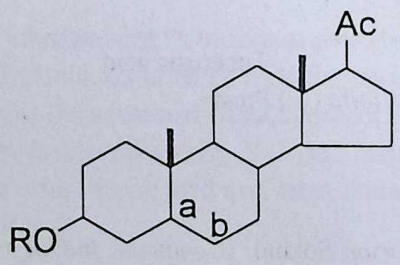

III
R = Glu[(2→1)Glu](6→1)Glu
IV
R = Glu(6→1)Apiose, ab = Δ

N. odorum Soland.; see *N. indicum* Mill.

N. oleander L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 502).

Neutral fraction from leaves at low doses caused sedation whereas at high doses it produced hypnosis in mice; marked suppression of locomotor activity was also observed. It blocked convulsions induced by GABA receptor antagonists, picrotoxin and bicuculline and

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enhanced oxotremorine-induced tremor (*Proc. Pak. Acad. Sci.* 1993, *30,* 11; *Chem. Abstr.* 1993, *119,* 131318 h).

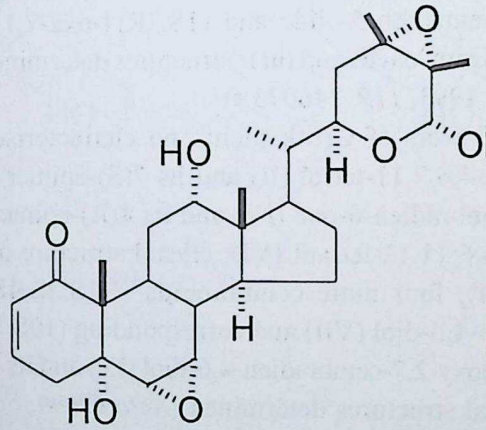
Stem contained alanine, arginine, aspartic acid, cysteine, glutamic acid, glycine, histidine, leucine, isoleucine, lysine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine and valine (*J. Inst. Chemists,* Calcutta 1989, *61,* 229; *Chem. Abstr.* 1991, *114,* 3397 t); a polysaccharide (2.3%), containing galacturonic acid, rhamnose, arabinose and galactose isolated from leaves (*Pharmazie* 1991,*46,* 657; *Chem. Abstr.* 1992, *116,* 158671 t).

NICANDRA (Solanaceae)

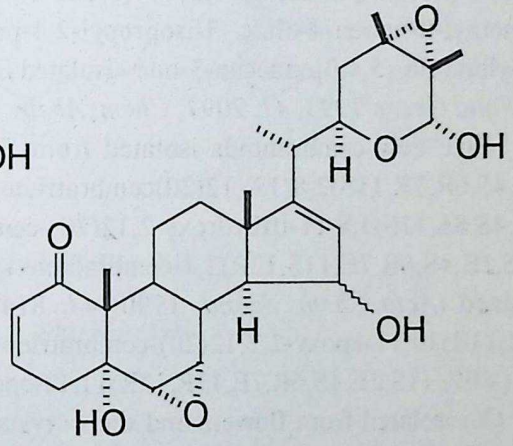
N. physaloides (L.) Gaertn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 448).

Five new ergostane-related compounds - nicaphysalins A, B, C, D and E - isolated from whole plant and their structures established (*Chem. Pharm. Bull.* 1994, *42,* 318).

NEW COMPOUNDS



Nicaphysalin A

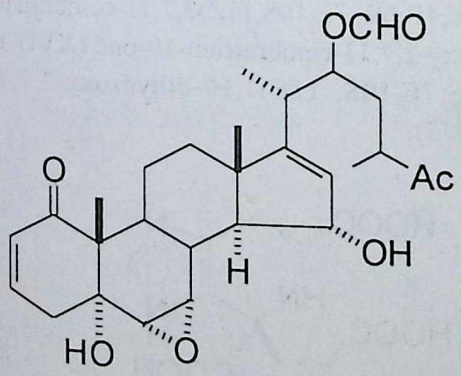


Nicaphysalin B

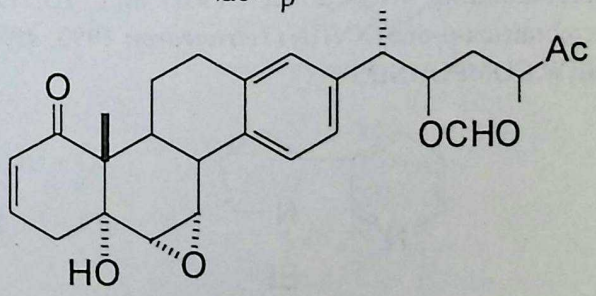
~~ = α

Nicaphysalin C

~~ = β



Nicaphysalin D



Nicaphysalin E

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NICOTIANA (Solanaceae)

N. tabacum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 504).

Isolation and structure determination of 10β-hydroxysolanascone-β-glucoside and 9β-hydroxysolanascone-β-glucoside from flue-cured leaves (*Agric. Biol. Chem.* 1989, *53,* 3037); a new opine - mikimopine - from hairy roots induced by *Agrobacterium rhizogenes* (*Phytochemistry* 1990, *29,* 3131); isolation, structure elucidation and synthesis of N'-ethylnornicotine from leaves (*Phytochemistry* 1990, *29,* 3693); identification of trilinolein, palmitodilinolein, linoleic acid, cholesterol and cycloartenol in seeds (*J. Am. Oil Chemists Soc.* 1991, *68,* 29; *Chem. Abstr.* 1991, *114,* 98543 z); isolation from flue-cured leaves of a sesquiterpenoid glucoside (I) and its structure elucidation as 1β-hydroxydebneyol-12-O-β-D-glucoside (*Agric. Biol. Chem.* 1991, *55,* 1889); detection of two glutamine synthetase polypeptides (44 and 39 KD) in leaves by immunocytochemical method (*Plant Physiol.* 1992, *100,* 1591; *Chem. Abstr.* 1993, *118,* 19264 r); new lactones - 3-(4-methyl-1-pentyl)-2-buten-4-olide, 3-isopropyl-2-penten-4-olide, 3-ethyl-4-methyl-2-penten-4-olide, 4-methyl-3-(3-oxo-1-butyl)-2-penten-4-olide, (3R,4R,7R)3,7-epoxy-4,8-dimethyl-8-nonen-4-olide, 3-isopropyl-2,4-pentadien-5-olide and (1S,7R)4-oxa-7,11,11-trimethylbicyclo-[5,4,0]undecan-3-one - isolated from leaves and their structures determined (*J. Agric. Food Chem.* 1993, *41,* 2097; *Chem. Abstr.* 1993, *119,* 246073 s).

Five new cembranoids isolated from flowers of Greek plant and characterised as (1S,2E,4S,6R,7R,11S)2,8(19),12(20)cembratrien-4,6,7,11-tetrol (II) and its 7(S)-epimer (III), (1S,2E,4S,8S,11S)4,8,11-trihydroxy-2,12(20)-cembradien-6-one (IV) and its 8(R)-epimer (V) and (1S,2E,4S,6R,7E,11S,12R)2,7-cembradien-4,6,11,12-tetraol (VI); crystal structure of (II) determined (*Acta Chem. Scand.* 1990, *44,* 814); four more cembranoids - (1S,2S,4S,6R,7E,10R,11R)10,11-epoxy-2,7,12(20)-cembratrien-4,6-diol (VII) and corresponding (10S,11S)-isomer (VIII), (1S,2E,4S,6R,7E,11R,12R)11,12-epoxy-2,7-cembradien-4,6-diol (IX) and its 4(R)-epimer (X) isolated from flowers and their crystal structures determined (*Acta Chem. Scand.* 1992, *46,* 789); flowers of Greek plant afforded eight more cembranoids which were characterised as (1S,2E,4S,6R,7E,10R,11E)2,7,11-cembratrien-4,6,10-triol (XI) and corresponding 10(S)- (XII), 4(R)- (XIII) and (4R,10S)- (XIV) diastereomers, (1S,2E,4R,6R, 7E,10S,11Z)2,7,11-cembratrien-4,6,10-triol (XV), (1S,2E, 4S,6R,7E,11E)4,6-dihydroxy-2,7,11-cembratrien-10-one (XVI) and corresponding 4(R)-epimer (XVII) and (1S,2E,4S,7E,10S, 11E)4,10-dihydroxy-2,7,11-cembratrien-6-one (XVIII) (*Tetrahedron* 1993, *49,* 4975).

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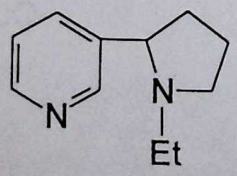
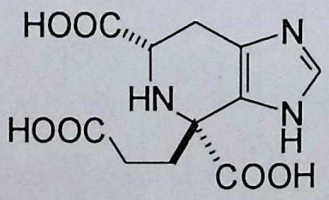


N'-Ethylnornicotine



Mikimopine

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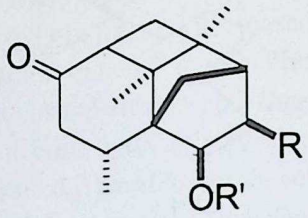
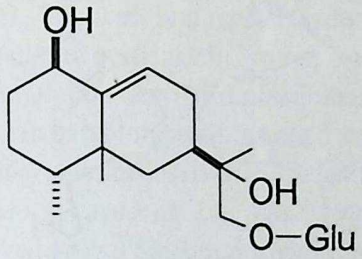
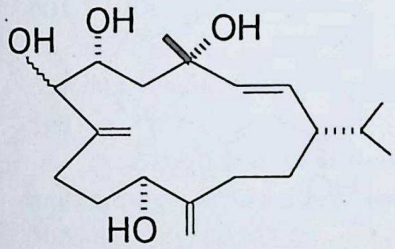
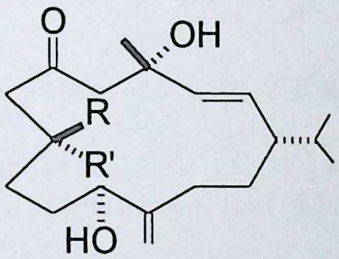


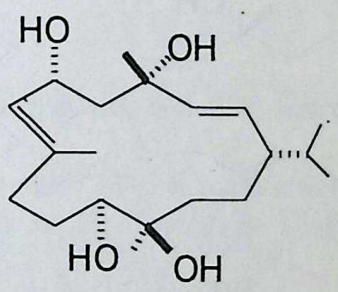


10β-Hydroxysolanascone-β-glucoside
R = H, R' = O-Glu
9β-Hydroxysolanascone-β-glucoside
R = O-Glu, R' = H

I



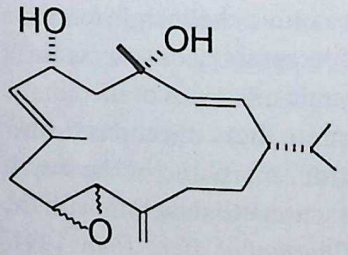


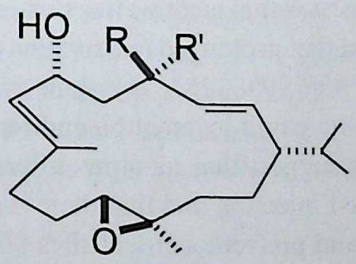


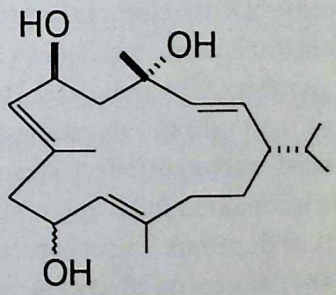
II
~~ = β
III
~~ = α

IV
R = OH, R' = Me
V
R = Me, R' = OH

VI







VII
~~ = α
VIII
~~ = β

IX
R = Me, R' = OH
X
R = OH, R' = Me

XI
~~ = α
XII
~~ = β

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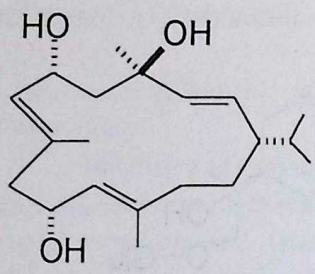
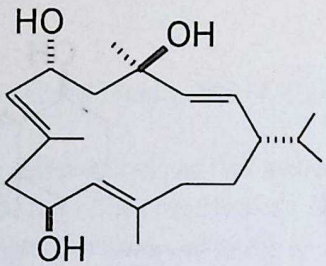


XIII



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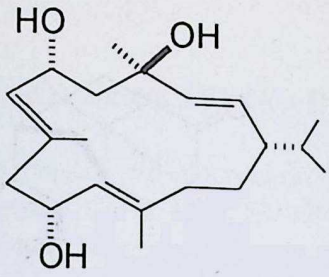

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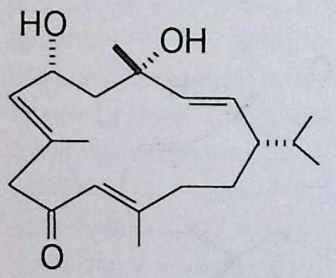
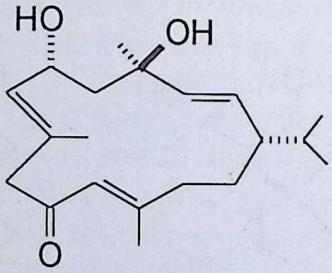


XVI



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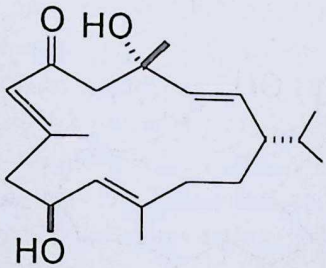

XVIII

BIOLOGICAL ACTIVITY

Study of acute administration of nicotine, i.v., on prolactin release in conscious, unrestrained rats showed that after briefly activating neuronal nicotinic cholinergic receptors, nicotine caused their inactivation. Thus, its predominant effect is as antagonist, which could account for increase in nicotinic cholinergic binding sites after its chronic administration (*J. Pharmacol. Exp. Ther.* 1990, *252,* 15); study of chronic i.v. administration of nicotine on nicotine-induced prolactin release in rats suggested that nicotine inactivates nicotinic cholinergic receptors in brain by allosteric mechanism and that prolonged inactivation of receptors leads to increase in their number (*J. Pharmacol. Exp. Ther.* 1990, *252,* 21); acute systemic injections of nicotine as well as morphine in rats produced increased locomotion and repeating these injections further enhanced locomotor effect. Results suggest that nicotine differs from morphine in the way it elicits locomotion following repeated injection and that there is functional interaction with the effects of dopamine in subcortical and prefrontocortical sites (*J. Pharmacol. Exp. Ther.* 1991, *261,* 484): studies on effect of nicotine on adrenergic and sensory nerves in tail artery ring segments of rat and isolated perfused mesenteric vasculature, suggested that at low concentration (0.03-0.3 mM) nicotine activates capsaicinsensitive sensory nerves via nicotinic receptors. At higher concentration (0.05-0.5 mM) nicotine relaxes vascular smooth muscle directly, independent of sensory nerves; moreover it does not augment contractile responses to adrenergic nerve stimulation

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in rat tail artery (*J. Pharmacol. Exp. Ther.* 1993, *264,* 1305); acute and repeated administration of nicotine (0.9 mg/kg, i.p.) decreased high voltage spindles in cortical EEG in rats and completely suppressed them at 2.7 mg/kg. Nicotinic receptor stimulation desynchronized neocortical EEG activity in normal animals, but this action disappeared in basal forebrain-lesioned animals. Thus, action of nicotine in reversing EEG and behavioural abnormalities observed in Alzheimer's disease, may be limited if basal forebrain cell loss is extensive (*J. Pharmacol. Exp. Ther.* 1993, *267,* 776); cigarette smoking or a low dose of nicotine, s.c., improved mental functioning in abstinent smokers. Nicotine significantly increased heart rate and blood-nicotine levels were lower than expected from a preliminary study in smokers. These findings suggest that even a low dose of nicotine directly affects attention or stimulusprocessing components of information processing (*Psychopharmacol.* 1994, *114,* 628; *Chem. Abstr.* 1994, *121,* 49982 c).

NIGELLA (Ranunculaceae)

N. damascena L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 493).

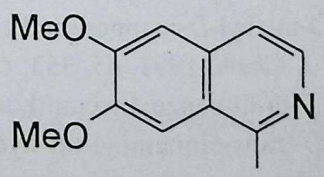
Determination of linoleic (45.75), oleic (33.28), palmitic (7.84), eicosadienoic (4.24) and capric (3.28%) acids in seed oil (*Acta Pharm. Turc.* 1990, *32,* 41; *Chem. Abstr.* 1991, *114,* 5055 d).

N. sativa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 507).

Fraction of seed extract which contained certain fatty acids, showed *in vitro* cytotoxicity against Ehrlich ascites carcinoma (EAC) (IC50 1.5 μg), Dalton's lymphoma ascites (IC50 3.0 μg) and sarcoma-180 (IC50 1.5 μg). At dose of 2.0 mg/mouse/day x 10, *in vivo*, EAC tumor development was completely inhibited (*Cancer Lett.* 1992, *63,* 41; *Chem. Abstr.* 1992, *117,* 452 h); single injection of seed extract (0.16 g/kg) significantly increased lifespan of mice bearing EAC (*Egypt. J. Biochem.* 1992, *10,* 348; *Chem. Abstr.* 1992, *119,* 393 f).

Isolation and structure elucidation of isoquinoline alkaloid - nigellimine - from seeds (*J. Nat. Prod.* 1992, *55,* 676); lipid content of seeds from central India was 31.8%, its composition determined (*J. Food Sci. Technol.* 1993, *30,* 54; *Chem. Abstr.* 1993, *119,* 115831 q).

NEW COMPOUNDS



Nigellimine

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NIPHOBOLUS (Polypodiaceae)

N. heteractis Bedd.; see *Pyrrosia lingua* (Thunb.) Farwell

NOTHAPODYTES (Icacinaceae)

N. foetida (Wt.) Sleum.; see *N. nimmoniana* (Graham) Mabberley

N. nimmoniana (Graham) Mabberley syn. *Mappia foetida* (Wt.) Miers, *M. oblonga* Miers var. *elliptica* Miers, *M. ovata* Miers, *M. tomentosa* Miers, *Nothapodytes foetida* (Wt.) Sleum. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 508).

Synthesis of (S)camptothecin (*Tetrahedron Lett.* 1989, *30,* 2639); process developed for extraction of camptothecin (Jpn. 3,272,628 (1991) Dec. 04; *Chem. Abstr.* 1992, *116,* 91367 c).

NOTHOPANAX (Araliaceae)

N. fruticosus Miq.; see *Polyscias fruticosa* (L.) Harms

NYCTANTHES (Oleaceae)

N. arbor-tristis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 509).

Alcoholic and butanol extracts exhibited antiviral activity (*Phytochemistry* 1990, *29,* 1917).

A glucomannan from seeds on acid hydrolysis yielded 4-O-β-D-mannopyranosyl-D-mannopyranose and O-β-D-glucopyranosyl(1→4)-O-β-D-mannopyranosyl(1→4)-O-β-D-mannopyranose (*J. Indian Chem. Soc.* 1989, *66,* 258); isolation and characterisation of three iridoid glycosides - arborsides A, B and C - from leaves (*J. Nat. Prod.* 1990, *53,* 303); two aryl ester of 6β-hydroxyloganin (I and II) isolated and their structures established; aryl ester (II) was identical to arborside C (*J. Indian Chem. Soc.* 1991, *68,* 581); another new iridoid glucoside - arbortristoside C - together with arbortristosides A, B and 6β-hydroxyloganin isolated (*J. Nat. Prod.* 1991, *54,* 1102); two more iridoid glucosides - arbortristosides D and E - isolated from seeds along with arbortristoside B and characterised (*Phytochemistry* 1990, *29,* 1917); acid hydrolysis of methylated seed glucomannan yielded 2,3,4,6-tetra-O-methyl-D-glucose, 2,3,6-tri-O-methyl-D-glucose, 2,3,6-tri-O-methyl-D-mannose and 2,3-di-O-methyl-D-mannose in molar ratio of 1:1:5:1 respectively (*Pol. J. Chem.* 1991, *65,* 353; *Chem. Abstr.* 1992, *116,* 148171 r); two more iridoid glucosides - 6,7-di-O-benzoylnyctanthoside and 6-O-trans-cinnamoyl-6β-hydroxyloganin - along with 7-O-trans-cinnamoyl-6β-hydroxyloganin isolated from leaves (*Phytochemistry* 1993, *32,* 375); isolation and structure elucidation of desrhamnosylverbascoside from leaves (*J. Indian Chem. Soc.* 1994, *71,* 215).

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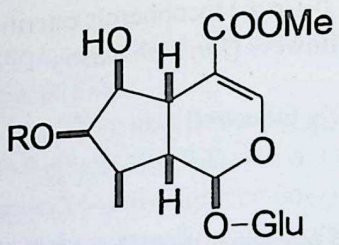
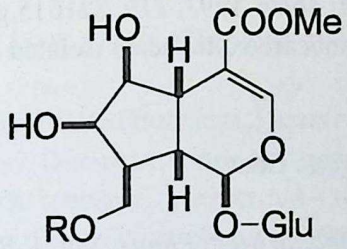
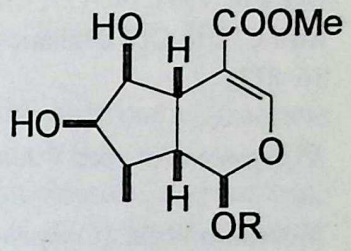


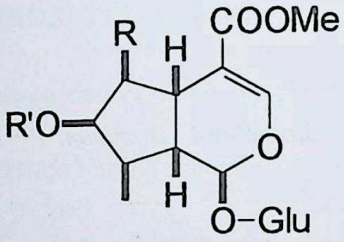
Arbortristoside C
R = β-Coumaroyl



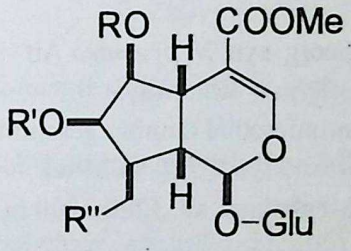
Arbortristoside D
R = Caffeoyl



Arbortristoside E
R =Glu(6-p-methoxy-cinnamoyl)



Arborside A
R = Benzoyloxy, R' = Benzoyl
Arborside B
R = H, R' = Benzoyl
Arborside C
R = OH, R' = Benzoyl
I
R = OH, R' = Trans-cinnamoyl



6,7-Di-O-benzoylnyctanthoside
R,R' = Benzoyl, R'' = OH
6-O-Trans-cinnamoyl-6β-hydroxyloganin
R = Trans-cinnamoyl, R',R'' = H

BIOLOGICAL ACTIVITY

Arbortristosides A, B, C and 6β-hydroxyloganin showed antileishmanial activity *in vitro* against amastigotes in macrophage culture and *in vitro* in hamster test system; oral administration of arbortristoside A (100.0 mg/kg, 5 days) to hamsters caused 57.0% inhibition (*J. Nat. Prod.* 1991, *54,* 1102); arbortristosides D and E exhibited antiviral activity (*Phytochemistry* 1990, *29,* 1917).

NYMPHAEA (Nymphaeaceae)

N. alba L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 495).

Quercetin, its 3-galactoside, 3-glucoside and 4′-β-xyloside, 3-methylquercetin-3′-β-xyloside, kaempferol, isokaempferol and apigenin isolated from flowers (*Acta Soc. Bot. Pol.*

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1991, *60*, 119; *Chem. Abstr.* 1993, *118*, 187841 v); flowers afforded ellagic and gallic acids, their methyl and ethyl esters, p-hydroxybenzoic, p-coumaric, vanillic and ferulic acids (*Acta. Soc. Bot. Pol.* 1991, *60*, 127; *Chem. Abstr.* 1993, *119*, 221615 g); α-, β-(or γ-) tocopherols esterified with C12 to C18 aliphatic monocarboxylic acids isolated from flowers (*Phytochemistry* 1994, *36*, 813).

N. pygmaea Ait.; see *N. tetragona* Georgi

N. stellata Willd. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 509).

A hot water-soluble polysaccharide isolated from flowers consisted of xylose (64.5) and arabinose (35.5%) (*Bangladesh J. Sci. Ind. Res.* 1992, *27*, 67; *Chem. Abstr.* 1993, *118*, 19199 y).

N. tetragona Georgi syn. *N. pygmaea* Ait.

Eng. - Pygmy water lily.

An antimicrobial tannin - geraniin - isolated (*Biosci., Biotechnol., Biochem.* 1993, *57*, 1570; *Chem. Abstr.* 1994, *120*, 4685 w).

Distribution: Meghalaya, alt. 1200-1800 m.

OCHNA (Ochnaceae)

O. obtusa DC. var. *obtusa* syn. *O. squarrosa* auct. (non L.), *O. squarrosa* var. *cordata* (Thw.) Bennett (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 453).

A new isoflavone - squarrosin - isolated from heartwood and its structure established: 5,3',4'-trimethoxy-6,7-methylenedioxyisoflavone, oleanolic acid and β-sitosterol also isolated (*Indian J. Chem.* 1989, *28*B, 780); root bark afforded 5,7,8-trimethoxy-3',4'-methylenedioxyisoflavone (*Fitoterapia* 1992, *63*, 249).

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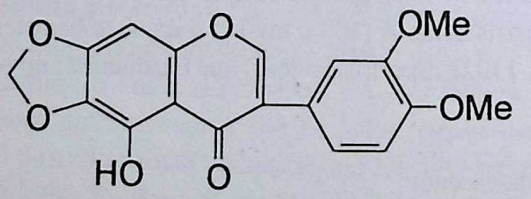

Squarrosin

O. squarrosa L.; see *O. obtusa* DC. var. *obtusa*

O. squarrosa var. *cordata* (Thw.) Bennett; see *O. obtusa* DC. var. *obtusa*

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OCHRADENUS (Resedaceae)

O. baccatus Delile (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 178).

Two new flavonoid glycosides isolated from aerial parts and characterised as quercetin-3-O-β-glucosyl(1→2)-α-rhamnosido-7-O-α-rhamnoside and quercetin-3-O-β-(6-p-coumaroyl) glucosyl(1→6)-β-glucosido-7-O-α-rhamnoside; quercetin-3-O-gentiobioside, isoquercitrin, quercitrin, astragalin and afzelin also isolated (*Phytochemistry* 1991, *30,* 3777); lupeol, apigenin, kaempferol, quercetin, kaempferitrin, rutin, 7-stigmastenol, 7-ergostenol and β-sitosterol glucoside isolated from plant growing in Egypt (*Zagazig J. Pharm. Sci.* 1994, *3,* 151; *Chem. Abstr.* 1994, *121,* 226451 b).

OCHROSIA (Apocynaceae)

O. borbonica J.F. Gmel.; see *Neisosperma oppositifolium* (Lamk.) Fosb. & Sach.

O. elliptica Labill (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 510).

Regioselective synthesis of ellipticine (*Tetrahedron Lett.* 1990, *31,* 1081).

O. oppositifolia (Lamk.) K. Schum.; see *Neisosperma oppositifolium* (Lamk.) Fosb. & Sach.

OCIMUM (Lamiaceae)

O. americanum L. syn. *O. canus* Sims. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 510).

Identification of α-pinene, β-pinene, camphene, myrcene, p-cymene, 1,8-cineole, terpinolene, linalool, camphor, citronellal, borneol, isoborneol, eugenol methyleugenol, isoeugenol, caryophyllene, humulene, acetoeugenol, methyl chavicol, nerol, geraniol and thymol in essential oil by GC-MS (*Philipp. J. Sci.* 1990, *119,* 347; *Chem. Abstr.* 1992, *117,* 239585 r); four new sesquiterpene alcohols - copan-3-ol, cop-11(12)-en-3-ol, cop-3(15)-en-11-ol and cop-10(11)-en-3,12-diol - isolated from volatile oil and their structures determined; α-pinene, β-pinene, sabinene, myrcene, car-3-ene, limonene, α-phellandrene, p-cymene, γ-terpinene, epoxytagetone, camphor, α-(–)gurjunene, α-humulene, isohumulene, eremophilene, allo-aromadendrene, borneol, γ-patchoulene, γ-selinene, α-copaene and myrtenol also isolated (*Phytochemistry* 1991, *30,* 691).

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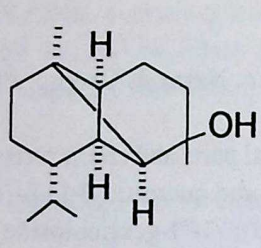
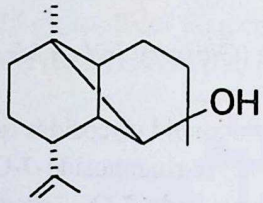
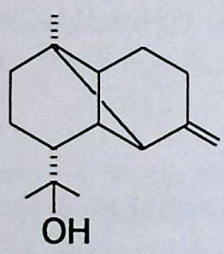


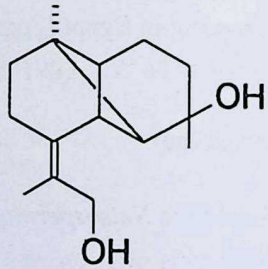
Copan-3-ol



Cop-11(12)-en-3-ol



Cop-3(15)-en-11-ol



Cop-10(11)-en-3,12-diol

O. basilicum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 510).

Essential oil at concentration of 0.15% compeletely inhibited mycelial growth of twenty two species of fungi including mycotoxin-producing strains of *Aspergillus flavus* and *A. parasiticus* and repelled the insect, *Allacophora foveicollis.* Toxic dose of oil against test fungi was much lower than that of some fungicides and fumigants (*Can. J. Bot.* 1989, *67,* 2085; *Chem. Abstr.* 1990, *112,* 34580 k).

Linalool, estragole and eugenol identified in various basil oils by GC-MS (*J. Essent. Oil Res.* 1989, *1,* 137; *Chem. Abstr.* 1990, *113,* 103186 w); isolation of p-coumaric acid, aesculetin, eriodictyol, its 7-glucoside and vicenin 2 from leaves (*Plant. Med. Phytother.* 1990, *24,* 193; *Chem. Abstr.* 1991, *114,* 118525 a); linalool (32.2) and methyl chavicol (16.42%) determined in essential oil of plant grown in Portugal (*J. Essent. Oil Res.* 1990, *2,* 263; *Chem. Abstr.* 1991, *114,* 68840 b); linalool (52.3-59.3), eugenol (9.67-17.63), cineole (3.88-5.26), β-terpinene (2.07-2.80), methyl cinnamate (2.79-4.52), methyl chavicol (2.20-4.02) and terpinen-4-ol (1.90-2.43%) detetmined in various samples of essential oil by GC (*Bol. Fac. Farm. Coimbra* 1991, *15,* 47; *Chem. Abstr.* 1993, *119,* 79790 q); determination of methyl chavicol (66.75), 1,8-cineole (5.44), linalool (4.95) and α-bisabolene (3.60%) in essential oil from Cuban basil by GC-MS (*Nahrung* 1993, *37,* 501; *Chem. Abstr.* 1994, *120,* 190052 k; *J. Essent. Oil Res.* 1994, *6,* 89; *Chem. Abstr.* 1994, *121,* 42381 x).

O. canus Sims.; see *O. americanum* L.

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O. gratissimum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 511).

Eugenol identified in oil by GC (*Yaowu Fenxi Zazhi* 1990, *10,* 154; *Chem. Abstr.* 1990, *113,* 198091 y); methyleugenol (46.83) and eugenol (19.26%) determined in oil from leaves and stems of Brazilian Amazon plant (*Z. Naturforsch.* 1990, *45*C, 1073; *Chem. Abstr.* 1990, *113,* 229893 t); geraniol (83.7-88.8), γ-muurolene (1.58-3.88), β-caryophyllene (1.2-2.29), neral (1.35-3.82) and limonene (0.74-1.91%) determined in essential oils of leaves (1.34), flowers (1.49) and stems (0.14%) by GC-MS (*J. Essent. Oil Res.* 1992, *4,* 231; *Chem. Abstr.* 1993, *118,* 175481 q).

O. kilimandscharicum Guerke (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 511).

Linalool (41.98, 58.85), camphor (17.02, 15.82) and 1,8-cineole (10.18, 6.38%) detetmined in leaf oil (0.77-1.12%) and flower oil (1.96-2.8%), respectively (*J. Essent. Oil Res.* 1992, *4,* 125; *Chem. Abstr.* 1993, *118,* 143506 k).

O. sanctum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 511).

Administration of extracts of seeds and leaves to rabbits for 4 weeks caused significantly decrease in uric acid level in serum and its corresponding increase in urine; at end of 4th week significanly increase in urea levels in both blood and urine and in urinary volume was observed (*Indian J. Physiol. Pharmacol.* 1990, *34,* 61); extract of leaves (0.1 to 0.4 g/kg) along with normal diet was given to adult male rats for 15 days and their sexual behaviour monitored on every alternate day. There was significant decrease in sexual behaviour score at dose of 0.2 g/kg and 0.4 g/kg (*Indian J. Physiol. Pharmacol.* 1992, *36,* 109); extract of leaves significantly reduced elevated enzyme levels and, thus, protected rats against hepatic cell damage caused by paracetamol (*Indian J. Pharmacol.* 1992, *24,* 163); extract of leaves significantly decreased incidence of both benzo[a]pyrene-induced neoplasia in Swiss mice and 3'-methyl-4-dimethylaminoazobenzene (3'-MeDAB)-induced hepatomas in rats (*Food Chem. Toxicol.* 1992, *30,* 953; *Chem. Abstr.* 1993, *11*B, 100782 e); acute and chronic administration of plant extract to pyloric-ligated and pyloric-ligated plus aspirin-treated rats reduced ulcer index and free and total acidity. Seven days pretreatment with drug increased mucous secretion. Thus, extract has antiulcerogenic property against experimental ulcers (*Indian J. Physiol. Pharmacol.* 1993, *37,* 91).

Ursolic acid isolated from leaves (*J. Drug. Dev.* 1989, *2,* 179; *Chem. Abstr.* 1990, *112,* 91452 u); caryophyllene, eugenol and β-elemene identified in essential oil (*Plant. Med. Phytother.* 1990, *24,* 79; *Chem. Abstr.* 1991, *114,* 68842 e); two new phenylpropane glycosides isolated and characterised as 4-allyl-1-O-β-D-glucopyranosyl-2-hydroxybenzene and 4-allyl-1-O-β-D-glucopyranosyl-2-methoxybenzene; vicenin 2, apigenin-6,8C-diglucoside, luteolin-5-O-glucoside, rosmarinic acid, cirsilineol, gallic acid, its methyl and ethyl esters, protocatechuic acid, vanillic acid, caffeic acid, chlorogenic acid, 4-hydroxybenzoic acid, vanillin and 4-hydroxybenzaldehyde also isolated (*Planta Med.* 1992, *58,* 574).

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BIOLOGICAL ACTIVITY

Ursolic acid, (1.0, 10.0 and 100.0 mg/ml) pretreatment produced concentration-dependent inhibition of compound 48/80-induced degranulation of mesenteric mast cells. Histamine release from peritoneal mast cells was also inhibited by ursolic acid. Thus, Ursolic acid may have antiallergic potential (*J. Drug. Dev.* 1989, *2,* 179; *Chem. Abstr.* 1990, *112,* 91452 u).

O. tenuiflorum L.; see *Geniosporum tenuiflorum* (L.) Merrill

OENANTHE (Apiaceae)

O. javanica (Bl.) DC. syn. *O. stolonifera* (Roxb.) Wall. ex DC. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 457).

Falcarinol determined in stems and roots by GC-MS (*Han'guk Nonghwa Hakhoechi* 1990, *33,* 120; *Chem. Abstr.* 1991, *114,* 58933 v); isorhamnetin, hyperin, β-sitosterylglucoside and stigmasterylglucoside isolated (*Saeng'yak Hakhoe Chi* 1993, *24,* 244; *Chem. Abstr.* 1994, *120,* 116542 d).

O. stolonifera (Roxb.) Wall. ex DC.; see *O. javanica* (Bl.) DC.

OENOTHERA (Oragraceae)

O. odorata Jacq.

Eng. - Evening primrose.

Linalool (70.0%) determined in flower oil (*Zhiwu Xuebao* 1989, *31,* 69; *Chem. Abstr.* 1990, *112,* 4549 q).

Distribution: Native of Chile, introduced into Indian gardens.

OLDENLANDIA (Rubiaceae)

O. corymbosa L. syn. *Hedyotis corymbosa* (L.) Lam. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 458).

Four new 10-acyliridoid glucosides isolated from Phillippines plant and characterised as 10-O-benzoyldeacetylasperulosidic acid methyl ester, 10-O-benzoyl-, 10-O-p-hydroxybenzoyl- and 10-O-p-trans, cis-coumaroylscandoside methyl esters; asperuloside, deacetyl asperuloside, asperulosidic acid, deacetylasperulosidic acid and scandoside methyl ester also isolated (*Chem. Pharm. Bull.* 1991, *39,* 2049).

O. diffusa (Willd.) Roxb.; see *Hedyotis diffusa* Willd.

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OLEA (Oleaceae)

O. europaea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 511).

Extract of shoots and leaves and oleuropein showed hypoglycaemic activity in normal and alloxandiabetic rats (*Plant. Med. Phytother.* 1993, *26,* 300; *Chem. Abstr.* 1994, *121,* 271836 s).

Isolation and structure determination of maslinic acid from fruits (*Riv. Ital. Sostanze Grasse* 1989, *66,* 107; *Chem. Abstr.* 1990, *112,* 33347 c); a tertiary polyisoprenoid alcohol isolated from unsaponifiable fraction of oil and characterised as 2,6,10,15,19,23-hexamethyltetracos-3,6,10,14,18,22-hexaen-2-ol (*Grasas Aceites* 1992, *43,* 271; *Chem. Abstr.* 1994, *120,* 7179 v); leaves afforded quercetin, rutin, luteolin, its 7-glycoside and chlorogenic acid (*Chromatographia* 1992, *33,* 369; *Chem. Abstr.* 1992, *117,* 44589 n); ursolic acid (0.5%) isolated from flowers (*Rastit. Resur.* 1992, *28,* 79; *Chem. Abstr.* 1993, *118,* 251439 z); cornoside, oleuropein, demethyl-oleuropein and verbascoside isolated (*Phytochemistry* 1993, *32,* 455).

BIOLOGICAL ACTIVITY

Oleanolic acid prevented experimental liver injury induced by CCl_4 in rats. Serum glutamate-pyruvate transaminase and liver triglyceride levels of rats intoxicated with CCl_4 were markedly decreased, degeneration and necrosis of liver cells significantly diminished, glycogen content of liver cells was increased and damaged mitochondrial and endoplasmic structures of liver cells were restored by treatment with oleanolic acid (*Yaoxue Xuebao* 1982, *17,* 93; *Chem. Abstr.* 1983, *96,* 193225 r); immunoregulatory effects of oleanolic acid investigated in mice. It stimulated biosynthesis and release of prostaglandins E2, F2α (PGE2, PGF2α) and cAMP, but inhibited cGMP and histamine; since prostaglandins, cyclic nucleotides and histamine participate in many body functions including regulation of blood pressure and immune function, action of oleanolic acid on them may explain its effect in disease states (*Zhongguo Yaolixue Tongbao* 1991, *7,* 179; *Chem. Abstr.* 1992, *116,* 382 q); oleanolic acid (5.0 mg/kg/d for 4 days or 10.0 mg/kg/d for 7 days, s.c.) lowered blood glucose level in normal mice. Given before or after treatment with alloxan, it (5.0 mg/kg, 10.0 mg/kg for 7 days, s.c.) decreased blood glucose level in alloxan-diabetic mice. Thus, oleanolic acid showed hypoglycaemic effects (*Zhongguo Yaoke Daxue Xuebao* 1991,*22,* 210; *Chem. Abstr.* 1991, *115,* 270440 x).

Oleanolic acid exhibited anti-inflammatory activity in carrageenin- and dextran-induced oedema in rats, and marked anti-arthritic action in adjuvant-induced polyarthritis in rats and mice and in formaldehyde-induced arthritis in rats. It checked inflammation-induced increase in serum transaminase level, reduced exudate volume and inhibited leucocyte infiltration in carrageenin-induced pleurisy in rats. LD50 was found to be greater than 2.0 g/kg, p.o., in mice and rats (*J. Pharm. Pharmacol.* 1992, *44,* 456); oleanolic acid administered at 48, 24 and 1 hr before challenge inhibited induced immune complex allergic reaction (Arthur reaction) and leucocyte migratory response. It estabilized erythrocyte membranes, inhibited hind paw oedema

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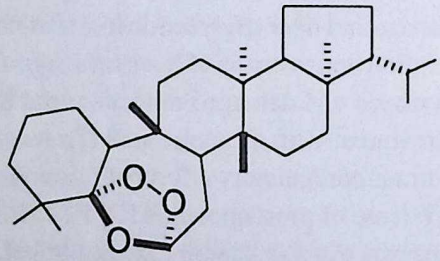
and suppressed release of PGE, histamine, LTB and kinin, and phlogistic action of PGE2 (*J. Chin. Pharm. Sci.* 1993, *2,* 69; *Chem. Abstr.* 1993, *119,* 151812 t); oleanolic and ursolic acids blocked adriamycin (ADR)-induced histamine release and ADR-induced degranulation of rat peritoneal mast cells *in vitro.* This effect may have implications in control of allergy, asthma and metastasis (*Med. Sci. Res.* 1994, *22,* 357; *Chem. Abstr.* 1994, *121,* 245484 f).

OLEANDRA (Oleandraceae)

O. wallichii (Hook.) Presl (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 297).

Isolation of adian-5-ene ozonide from rhizomes and its structure elucidation; hop-22(29)-ene, neohop-13(18)-ene, fern-7-ene, fern-8-ene, fern-9(11)-ene, adian-5-ene, dryocrassyl acetate, neriifolyl acetate, tetrahymanol, tetrahymanyl acetate, hopan-28,22-olide, hydroxyhopane, hopan-22,28-diol and neriifoliol also isolated (*Yakugaku Zasshi* 1991, *111,* 120; *Chem. Abstr.* 1991, *115,* 46033 j).

NEW COMPOUNDS



Adian-5-ene ozonide

OLIGOCHAETA (Asteraceae)

O. ramosa (Roxb.) Wagenitz; see *Amberboa ramosa* (Roxb.) Jafri

ONOSMA (Boraginaceae)

O. echioides L.; see *O. hispidum* Wall. ex D.Don

O. hispidum Wall. ex D.Don. syn. *O. echioides* sensu Clarke (non L.), *O. kashmiricum* Johnston (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 512).

Isolation of ursolic acid from roots (*Asian J. Chem.* 1990, *2,* 327; *Chem. Abstr.* 1990, *113,* 217925 s); two naphthoquinones - onosone A and onosone B - isolated from roots and their structures established (*Indian J. Chem.* 1993, *32*B, 390).

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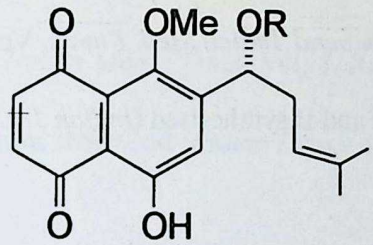


Onosone A
R = COCH=CMe$_2$
Onosone B
R = H

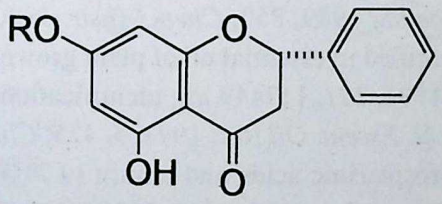
O. kashmiricum Johnston; see *O. hispidum* Wall. ex D.Don

ONYCHIUM (Cryptogrammaceae)

O. japonicum (Thunb.) Kuntze (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 499).

A new flavanone glycoside - onychin - isolated from aerial parts and its structure determined; wallichoside and onychiol B also isolated (*Phytochemistry* 1993, *33,* 510).

NEW COMPOUNDS



Onychin
R = Glu(2→)Rha

BIOLOGICAL ACTIVITY

Onychin, wallichoside and onychiol B exhibited activity against P-388 lymphocytic leukaemia (*Phytochemistry* 1993, *33,* 510).

OPHELIA (Gentianaceae)

O. angustifolia D.Don; see *Swertia angustifolia* Buch.-Ham. ex D.Don

O. chirata Griseb.; see *Swertia chirayita* (Roxb. ex Flem.) Kars.

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OPHIOPOGON (Liliaceae)

O. japonicus Ker-Gawl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 513).

Ophiopogonones A and B synthesised (*Indian J. Chem.* 1990, *29*B, 338).

OPUNTIA (Cactaceae)

O. dillenii (Ker-Gawl.) Haw.; see *O. elatior* Mill.

O. elatior Mill. syn. *O. dillenii* auct. pl. [non (Ker-Gawl.) Haw.] (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 500).

Isolation of a red pigment - betanin - from ripe fruit (*Tianran Chanwu Yanjiu Yu Kaifa* 1992, *4,* 15; *Chem. Abstr.* 1992, *117,* 190506 z).

ORIGANUM (Lamiaceae)

O. majorana L.; see *Majorana hortensis* Moench

O. vulgare L. ssp. *vulgare* (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 515).

Cinnamic, p-hydroxybenzoic, vanillic, syringic, protocatechuic, caffeic and chlorogenic acids isolated (*Khim. Prir. Soedin.* 1989, 850; *Chem. Abstr.* 1990, *112,* 115824 v); p-cymene, carvacrol and γ-terpinene identified in essential oil of plant grown in Chile (*An. R. Acad. Farm.* 1992, *58,* 509; *Chem. Abstr.* 1994, *121,* 117449 m); identification of terpinen-4-ol, germacrene D and β-caryophyllene in oil (*J. Essent. Oil Res.* 1993, *5,* 425; *Chem. Abstr.* 1994, *121,* 132590 u); caffeic, chlorogenic and rosmarinic acids and tannin (9.7%) isolated (*Bull. Fac. Pharm.,* Cairo Univ. 1993, *31,* 237; *Chem. Abstr.* 1994, *120,* 212569 p).

OROBANCHE (Orobanchaceae)

O. aegyptiaca Pers. syn. *O. indica* Buch.-Ham. ex Roxb. (non Spreng.), *O. ramosa* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 500).

Tricin, apigenin, luteolin, β-sitosterol-β-D-glucoside and mixture of β-sitosterol, stigmasterol and campesterol isolated (*Mansoura J. Pharm. Sci.* 1992, *8,* 202; *Chem. Abstr.* 1993, *118,* 143428 m); isolation of acteoside, 2'-O-acetylacteoside, poliumoside and 2'-O-acetylpoliumoside (*Mansoura J. Pharm. Sci.* 1993, *9,* 225; *Chem. Abstr.* 1994, *121,* 78269 f).

O. indica Buch.-Ham. ex Roxb.; see *O. aegyptiaca* Pers.

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O. ramosa L.; see *O. aegyptiaca* Pers.

OROXYLUM (OROXYLON) (Bignoniaceae)

O. indicum (L.) Vent. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 516).

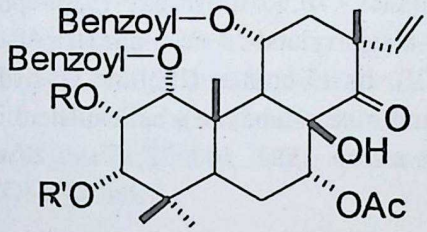
Isolation of ellagic acid from root wood (*Indian Drugs* 1991, *28,* 507).

ORTHOSIPHON (Lamiaceae)

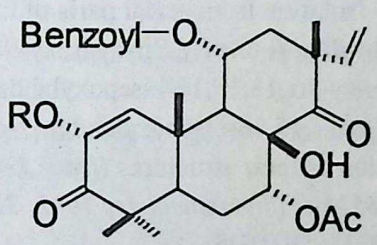
O. aristatus (Blume) Miq. syn. *O. grandiflorus* Boldingh., *O. stamineus* Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 518).

Two new pimarane diterpenes - orthosiphol A and orthosiphol B - isolated from leaves and their structures elucidated (*Tetrahedron* 1992, *48,* 6787; *Tetrahedron Lett.* 1992, *33,* 945); isolation of two new diterpenes - orthosiphol D and orthosiphol E - and their structure determination; rosmarinic acid, sinensetin, scutellarein tetramethyl ether, salvigenin and orthosiphols A and B also isolated (*Phytochemistry* 1993, *33,* 411).

NEW COMPOUNDS



Orthosiphol A
R = Ac, R' = H
Orthosiphol B
R = H, R' = Ac



Orthosiphol D
R = Ac
Orthosiphol E
R = H

BIOLOGICAL ACTIVITY

Orthosiphols A and B showed potent inhibitory activity against inflammation induced by tumor promotor TPA in mouse ear (*Tetrahedron* 1992, *48,* 6787); sinensetin and 3'-hydroxy-5,6,7,4'-tetramethoxyflavone exhibited diuretic activity but no choleretic activity in rats (*Fitoterapia* 1993, *64,* 99).

O. grandiflorus Boldingh.; see *O. aristatus* (Blume) Miq.

O. stamineus Benth.; see *O. aristatus* (Blume) Miq.

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OSBECKIA (Melastomataceae)

O. chinensis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 519).

Isolation of 2-furoic acid, ursolic acid, succinic acid, quercetin and daucosterol from whole plant (*Zhongguo Zhongyao Zazhi* 1991, *16,* 99; *Chem. Abstr.* 1991, *115,* 25983 d).

BIOLOGICAL ACTIVITY

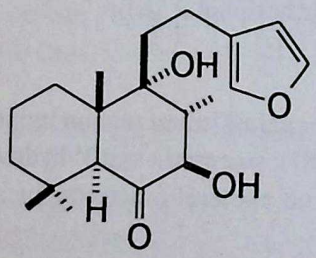
Ellagic acid suppressed increase in lipid peroxidation induced by CCl_4 and cobalt-60 irradiation and this effect was more than that of α-tocopherol (*J. Clin. Biochem. Nutr.* 1990, *8,* 209; *Chem. Abstr.* 1991, *115,* 41927 u); gallic acid showed anti-inflammatory activity against zymosan-induced acute footpad swelling in mice. *In vitro* studies showed that gallic acid interferes with functioning of polymorphonuclear leukocytes while SAR studies showed that o-dihydroxy group is important for inhibitory activity (*Planta Med.* 1992, *58,* 499).

OTOSTEGIA (Lamiaceae)

O. aucheri (Boiss.) Boiss. syn. *Ballota aucheri* Boiss. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 183).

Isolation from aerial parts of five new labdanes - 7β,9α-dihydroxy-15,16-epoxylabda-13(16),14-dien-6-one (I), 7β-hydroxy-9α,13,15,16-bisepoxylabd-14-en-6-one (II), 6β-hydroxy-15-methoxy-9α,13,15,16-bisepoxylabdan-7-one (III), its 15-epimer (IV) and 6β-hydroxy-15-ethoxy-9α,13,15,16-bisepoxylabdan-7-one (V) - and a seco-labdane - balloaucherolide - and elucidation of their structures (*Iran. J. Chem. Chem. Eng.* 1991, *100,* 72; *Chem. Abstr.* 1992, *117,* 248545 e; *Phytochemistry* 1992, *31,* 344).

NEW COMPOUNDS



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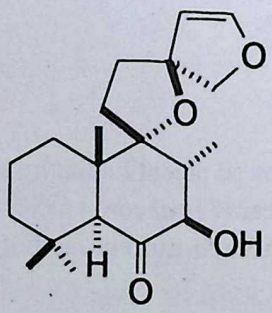

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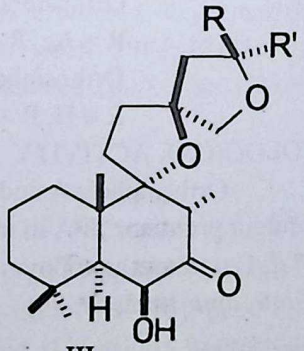

III
R = OMe, R' = H
IV
R = H, R' = OMe
V
R = OEt, R' = H

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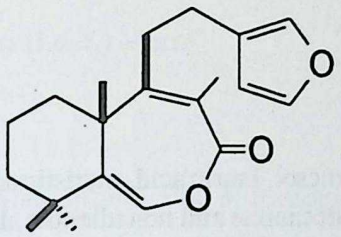

Balloaucherolide

OXALIS (Oxalidaceae)

O. corniculata L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 503).

Vitexin, its 2"-O-β-D-glucoside and isovitexin isolated (*Fitoterapia* 1992, *63,* 89); isolation of 2-heptenal, 2-pentylfuran and trans-phytol(7,3,11,15-tetramethyl-2-hexadecen-1-ol) (*Zhonghua Yaoxue Zažhi* 1992, *44,* 265; *Chem. Abstr.* 1992, *117,* 188244 u).

OXYCEROS (Rubiaceae)

O. longiflora (Lamk.) Yamazaki syn. *Randia longiflora* Lamk. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 209).

Isolation and structure elucidation of randiflorin and randilongin from leaves and twigs; ursolic acid also isolated (*J. Indian Chem. Soc.* 1989, *66,* 694).

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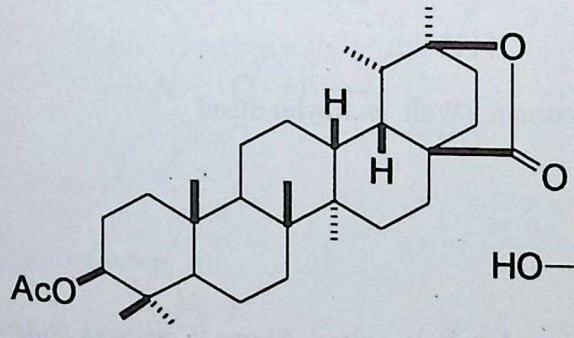
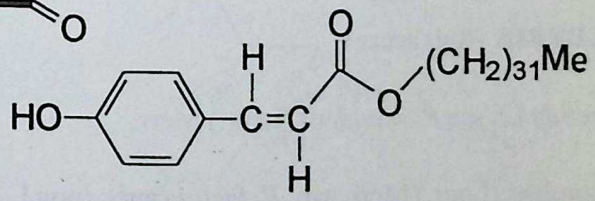


Randiflorin



Randilongin

OXYSTELMA (Asclepiadaceae)

O. esculentum (L.f.) R.Br. ex Schult.; see *Sarcostemma secamone* (L.) Bennet

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O. secamone (L.) Karst.; see *Sarcostemma secamone* (L.) Bennet

OXYTROPIS (Papilionaceae)

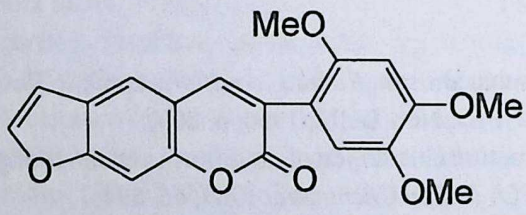
O. kansuensis Bunge

Identification of cis-farnesol, lauric acid, myristic acid, 12-methylmyristic acid, palmitic acid, 6,10,14-trimethyl-2-pentadecanone and nonadienoic aldehyde in essential oil obtained from poisonous grass of China (*Fenxi Ceshi Xuebao* 1994, *13*, 37; *Chem. Abstr.* 1994, *121*, 200903 a).
Distribution: Nepal, alt. 4200-4500 m.

PACHYRHIZUS (Papilionaceae)

P. tuberosus Spreng.

A new benzopyran (I) isolated from seeds and characterised as 6-(2,4,5-trimethoxyphenyl)-7H-furo[3,2g][1]-benzopyran-7-one; pachyrhizin also isolated (*Phytochemistry* 1992, *31*, 1831).
Distribution: Native of South America, introduced into India.
NEW COMPOUNDS



I

PADUS (Rosaceae)

P. cornuta (Wall. ex Royle) Carr.; see *Prunus cornuta* (Wall. ex Royle) Steud.

PAEDERIA (Rubiaceae)

P. foetida L.; see *P. scandens* (Lour.) Merr.

P. scandens (Lour.) Merr. syn. *P. foetida* auct. (non L.), *P. tomentosa* Blume (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, P. 503).

Isolation of epifriedelinol, embelin and β-sitosterol from aerial parts (*J. Bangladesh Acad. Sci.* 1991, *15*, 19; *Chem. Abstr.* 1991, *115*, 119898 g); leaves contained nonanoic, capric, lauric, myristic, arachidic and palmitic acids (*Indian J. Pharm. Sci.* 1993, *55*, 110); in oil from stems, leaves and flowers, linalool identified as major component (*Flavour Fragrance J.* 1994, *9*, 25; *Chem. Abstr.* 1994, *120*, 307186 a).

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P. tomentosa Blume; see *P. scandens* (Lour.) Merr.

PAEONIA (Ranunculaceae)

P. officinalis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 523).

Paeoniflorin synthesised (*J. Am. Chem. Soc.* 1993, *115,* 8871).

BIOLOGICAL ACTIVITY

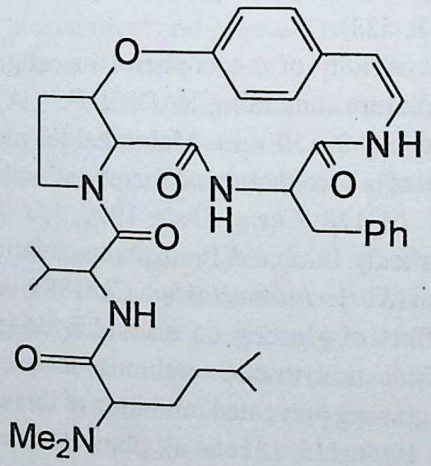
Paeoniflorin (1.0 mg/kg, p.o.) significantly attenuated radial maze performance deficit produced by scopolamine (0.3 mg/kg, i.p.) in Wistar rats. Propranolol and atenolol completely blocked antagonising effect of paeoniflorin on scopolamine deficit which suggests involvement of β-adrenergic systems in manifestation of this effect (*Jap. J. Pharmacol.* 1993, *62,* 345).

PALIURUS (Rhamnaceae)

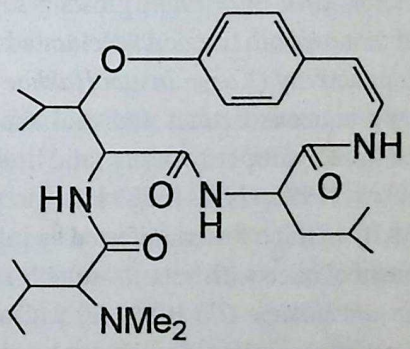
P. spina-christi Mill. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 523).

Leaves afforded isoquercitrin and rutin (*Acta Pharm. Jugosl.* 1990, *40,* 551; *Chem. Abstr.* 1991, *114,* 128874 c); isolation of frangulanine and amphibine C from ripe fruits and their structure determination; frangufoline and amphibine D also obtained (*Fitoterapia* 1993, *64,* 284).

NEW COMPOUNDS



Amphibine C



Frangulanine

PAMBURUS (Rutaceae)

P. missionis (Wt.) Swingle syn. *Atalantia missionis* (Wt.) Oliver (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, P. 465).

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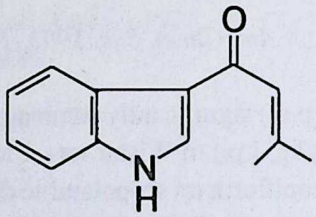
Isolation of a new indole - 3-(3-methyl-1-oxo-2-butenyl)-1H-indole (I) - from roots, along with 7-hydroxy-8-(3',7'-dimethylocta-2',6'-dienyl) coumarin and its structure elucidation; stem bark yielded I and xanthotoxin whereas xanthyletin, isopimpinellin, scopoletin, luvangetin and xanthotoxin obtained from fruits (*Phytochemistry* 1994, *36,* 879).

NEW COMPOUNDS



I

PANAX (Araliaceae)

P. bipinnatifidum Seem. (*bipinnatifidus*); see *P. pseudoginseng* Wall. ssp. *himalaicus* Hara var. *bipinnatifidus* (Seem.) Li

P. fruticosus L.; see *Polyscias fruticosa* (L.) Harms.

P. ginseng C.A. Mey. syn. *Aralia quinquefolia* Decne. & Planch. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 523).

Effects of saponin fraction on antioxidant activity of α-tocopherol investigated in microsomal preparation of rat liver incubated with mixture containing NADPH, Fe^{3+}, ATP and α-tocopherol, with or without ginseng saponin fraction, for 30 min. Malondialdehyde assay indicated that saponin fraction accelerated absorption of α-tocopherol and thereby stimulated its antioxidant activity (*Koryo Insam Hakhoe Chi* 1988, *12,* 128; *Chem. Abstr.* 1990, *113,* 126552 b); ginseng aqueous extract and diol saponins markedly inhibited lipid photooxidation and decreased lipid hydroperoxides in total lipids of serum (*Koryo Insam Hakhoe Chi* 1989, *13,* 234; *Chem. Abstr.* 1990, *113,* 165391 t); preventive effect of ginseng on acetaldehyde-induced acute toxicity in mice was manifested by inhibition of hepatic cytosolic xanthine oxidase activity. Pretreatment of mice with butanol-soluble fraction of ginseng prevented inhibition of this enzyme (*Koryo Insam Hakhoe Chi* 1989, *13,* 5; *Chem. Abstr.* 1990, *113,* 181664 a); plant extract (0.2 g/kg, i.p.) produced analgesia and hypothermia in rats which were not reversed by naltrexone. Low doses of ginseng (0.025 to 0.05 g/kg) antagonised analgesic response to morphine and morphine-induced hyperthermia was antagonised by 0.0125 to 0.2 g/kg of ginseng. Cataleptic effect of morphine was antagonised by 0.025 g/kg of ginseng (*Gen. Pharmacol.* 1990, *21,* 877; *Chem. Abstr.* 1991, *114,* 526; *Prog. Clin. Biol. Res.* 1990, *328,* 489; *Chem. Abstr.* 1990, *112,* 151278 d); daily administration of ginseng extract (0.015 and 0.050 g/kg) for 7 days to rats inhibited development of tolerance of analgesic effect of morphine; while its administration

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(0.05 to 0.10 g/kg) once daily for 7 days inhibited development of tolerance to hyperthermic effect of morphine. Thus, ginseng extract in appropriate doses, inhibits development of tolerance to pharmacological actions of morphine (*Gen. Pharmacol.* 1991, *22,* 521; *Chem. Abstr.* 1991, *114,* 240486 d).

Ginseng markedly reduced serum triglycerides and cholesterol in hyperlipidaemic monkeys; HDL-cholesterol/total cholesterol ratio was increased. Reduction in LDL and VLDL/cholesterol levels suggests that ginseng may have beneficial effects as antiatherogenic (*Indian J. Pharm. Sci.* 1991, *53,* 88); effect of root extract fraction containing mainly diol sponins of sleep-wake relation, water intake and locomotor activity studied in rats. It acutely increased diurnal slow wave sleep and chronically decreased nocturnal locomotor activity (*Iyo Kizai Kenkyusho Hokoku* 1991, *25,* 87; *Chem. Abstr.* 1993, *118,* 73510 f); root extract (0.1 mg/kg) produced rapid reversible reduction of Ca^{2+} current by 22.0% whereas treatment with pertussis toxin (0.25 μg/ml) reduced inhibition to 4.0%. Studies suggest that extract acts on sensory neurons through a similar pathway as that of μ-type opioids, both inhibit Ca^{2+} channels through pertussis toxin-sensitive GTP-binding proteins (*J. Ethnopharmacol.* 1994, *42,* 45); total saponins promoted hematopoesis in mice after phenylhydrazine treatment or cobalt 60 iradiation *in vivo* and *in vitro* (*Zhonghua Xueyexue Zazhi* 1990, *11,* 66; *Chem. Abstr.* 1990, *113,* 70948 r); flower saponins (0.05, 0.25 and 0.0125 g/kg, p.o.) raised level of myocardial cAMP in mice, whereas root saponins elevated the level at 0.050 g/kg dose only. Ratio of cAMP/cGMP in myocardium of mice was progressively increased by flower saponins (*Shenyang Yaoxueyuan Xuebao* 1991, *8,* 200; *Chem. Abstr.* 1992, *116,* 51173 e).

Saponins showed nonspecific enzyme stimulatory effect which might play a significant role in biochemical and physiological systems in living body (*Koryo Insam Hakhoe Chi* 1992, *16,* 53; *Chem. Abstr.* 1992, *117,* 163832 w); glycogen, succinic dehydrogenase and DNA levels of SGC-823 gastric tumor cells decreased after 24,28 and 72 hr incubation with volatile oil of ginseng, suggesting it may be inhibiting tumor growth by interfering with metabolism of carbohydrates and nucleic acid (*Zhongguo Zhongyao Zazhi* 1992, *17,* 110; *Chem. Abstr.* 1992, *116,* 227812 d).

Water-soluble fraction of leaf extract and a alkali-soluble polysaccharide fraction (GL-4) obtained therefrom, at dose of 0.05 to 0.2 g/kg, p.p., prevented HCl/ethanol-induced ulcerogenesis in mice in dose-dependent manner. It also inhibited formation of gastric ulcers induced by water immersion stress, indomethacin or pylorus-ligation. It significantly reduced both gastric acidity and pepsin activity in gastric juice (*Planta Med.* 1992, *58,* 432); GL-4 fraction was purified to yield a very active peptic polysaccharide, GL-4IIb1 III, which prevented HCl/ethanol-induced ulcerogenesis in mice in dose-dependent manner (*Planta Med.* 1992, *58,* 445); ginseng root saponins (0.1 g/kg) or ginsenoside Rb (0.01 g/kg, i.p. or i.g.) completely antagonised immunosuppression induced by cold water (4°) swim stress in rats and mice (CWSS) and inhibited increase of serum corticosterone in test animals (*Zhongguo Yaoli Xuebao* 1993, *14,* 401; *Chem. Abstr.* 1993, *119,* 241343 v); anti-hypercholesterolaemic activity of ginsenosides studied in rats fed high cholesterol diet. Ginsenosides brought down increased cholesterol level to normal and

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increased cAMP level which was usually reduced to 55.0% of that of control group due to presence of LDL in medium (*Koryo Insam Hakhoe Chi* 1993, *17,* 1; *Chem. Abstr.* 1994, *120,* 261007 n); ginseng fruit saponin decreased haemorrhagic shock and showed protective effect on myocardium in hybrid dogs (*Zhongguo Bingli Shengli Zazhi* 1993, *9,* 13; *Chem. Abstr.* 1994, *121,* 245585 q); an alkaline fraction obtained by ion-exchange treatment of aqueous extract of root, stimulated proliferation of baby hamster kidney-21 cells (*Planta Med.* 1994, *60,* 171); immunological activity of hot water-soluble fraction of wild *P. ginseng* evaluated for its mitogenic activity on lymphocytes; wild ginseng (100.0 μg/well) showed mitogenic activity almost equal that of con A (0.1 μg/well) which is well-known as T cell mitogen. However, similar fraction from cultivated ginseng was devoid of such activity (*Biochem. Biophys. Res. Commun.* 1994, *200,* 1672).

A process for isolation of ginsenoside Re from ginseng juice (CN 1,033,278 (1983) Jun. 07; *Chem. Abstr.* 1990, *113,* 84823 h); regio-and stereoselective synthesis of ginsenoside Rh2 (*Khim. Prir. Soedin.* 1989, 813; *Chem. Abstr.* 1990, *113,* 24363 y); a new saponin - ginsenoside Rg4 - isolated from leaves along with 20(R)protopanaxadiol and characterised as 3β,6α,12β-trihydroxydammar-20(22),24-diene-6-O-α-L-rhamnosyl-(1→2)-β-D-glucopyranoside (*Yaoxue Xuebao* 1989, *24,* 877; *Chem. Abstr.* 1990, *112,* 155253 q); isolation of four malonylated dammarane-type oligoglycosides - malonylginsenosides Rb1, Rb2, Rc and Rd - and their characterisation as 3-O-[6-O-malonyl-β-D-glucosyl(1→2)-β-D-glucopyranosyl]-20-O-[β-D-glucosyl(1→6)-β-D-glucosyl]-20(S)- protopanaxadiol, 3-O-[6-O-malonyl-β-D-glucosyl(1→2)-β-D-glucosyl]20-O-[α-L-arabinosyl(1→6)-β-D-glucosyl]-20(S)protopanaxadiol, 3-O-[6-O-malonyl-β-D-glucosyl(1→2)-β-D-glucosyl]20-O-[α-L-arabinofuranosyl(1→6)-β-D-glucopyranosyl]-20(S)protopanaxadiol and 3-O-[6-O-malonyl-β-D-glucosyl(1→2)-β-D-glucosyl]-20-O-[β-D-glucosyl]-20(S)protopanaxadiol respectively (*Chem. Pharm. Bull.* 1989, *37,* 2961; *Zhongguo Zhongyao Zazhi* 1993, *18,* 105; *Chem. Abstr.* 1993, *119,* 4962 p); ginsenosides identified in roots by HPLC (*Khim. Prir. Soedin* 1990, 57; *Chem. Abstr.* 1990, *113,* 29376 q; *Khim. Prir. Soedin.* 1991, 294; *Chem. Abstr.* 1992, *116,* 136089 g; *Eur. J. Pharm. Sci.* 1995, *3,* 77); fresh leaves contained 1.5% total saponin; ginsenoside La (0.013%) isolated from leaves (*Yaoxue Xuebao* 1990, *25,* 379; *Chem. Abstr.* 1990, *113,* 148924 b); isolation of a new saponin - ginsenoside F4 - from leaves, along with 20(R)protopanaxadiol, 20(R)protopanaxatriol, ginsenoside Rh3, 20(R)ginsenoside Rh2, 20(S)ginsenoside Rh2, ginsenosides Rh1, Rg3, Rg2, Rg1, Re, Rd, Rc, Rb2 and Rb1 and its structure elucidation (*Planta Med.* 1990, *56,* 298); identification of 20(R)ginsenoside Rh2 in fruits (*Zhongguo Zhongyao Zazhi* 1991, *16,* 678; *Chem. Abstr.* 1992, *117,* 66553 y); isolation of ginsenosides Rb2, Rc, Rd, Rg, Rg2, Rg3, Rh1 and Ro from rhizomes (*Shenyang Yaoxueyuan Xuebao* 1992, *9,* 103; *Chem. Abstr.* 1993, *118,* 487 u); stems and leaves of American ginseng afforded ginsenosides Rb2, Rb3, Rd, Re, F2, Rg1, Rh1 and Rh2 and pseudoginsenoside F11 (*Zhongguo Yaoxue Zazhi* 1993, *28,* 718; *Chem. Abstr.* 1994, *121,* 53890 p); isolation of 20(R)ginsenoside Rg3, 20(R)protopanaxatriol, daucosterol and β-sitosterol from fruits (*Zhongguo Zhongyao Zazhi* 1993, *18,* 296; *Chem. Abstr.* 1993, *119,* 113413 f); ginsenoside Re isolated from stems and leaves (*Bopuxue Zazhi* 1994, *11,* 1; *Chem. Abstr.* 1994, *120,* 294215 g).

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Two 5-lipoxygenase inhibitors - polyacetylene compound (I) and 1,8-heptadecadiene-4,6-diyne-3,10-diol - isolated and their structures determined (Jpn. 1,224,367 (1989) Sep. 07; *Chem. Abstr.* 1990, *112,* 164945 u); panaxydol (0.64%), panaxynol (0.42%) and panaxytriol determined in white ginseng by capillary GC (*Koryo Insam Hakhoe Chi* 1989, *13,* 183; *Chem. Abstr.* 1990, *113,* 178355 j; *Koryo Insam Hakhoe Chi* 1989, *13,* 198; *Chem. Abstr.* 1990, *113,* 217922 p); absolute configuration of panaxydol determined as (9S,10R) (*Bull. Korean Chem. Soc.* 1991, *12,* 122; *Chem. Abstr.* 1991, *115,* 49223 g); five new polyacetylenes - ginsenoynes A, B, C, D and E - isolated from roots and their structures established (*Phytochemistry* 1991, *30,* 3327); three new acetylated polyacetylenes - ginsenoynes F, G and H - isolated from roots and characterised as 3-acetoxy-9,10-epoxy-1,16-heptadecadien-4, 6-diyne; 3-acetoxy-9,10-epoxy-4,6-heptadecadiyne and 3-acetoxy-9,10-epoxy-16-heptadecene-4,6-diyne respectively (*Phytochemistry* 1991, *30,* 4053); isolation of another three new acetylenic compounds - ginsenoynes I, J and K - from roots and their structure elucidation (*Phytochemistry* 1992, *31,* 899); three new linoleoylated acetylenic compounds - panaxynol linoleate, panaxydol linoleate and ginsenoyne A linoleate - isolated from roots and their structures determined (*Phytochemistry* 1994, *35,* 963).

Dencichin isolated from Korean red ginseng (*Wakan, Iyaku Gakkaishi* 1991, *8,* 34; *Chem. Abstr.* 1992, *116,* 34527 f); process developed for isolation of hypoglycaemic karusans A, B, C, D and E from roots (Jpn. 2,67,301 (1990) Mar. 07; *Chem. Abstr.* 1990, *113,* 84822 g); a peptic polysaccharide (GL-4IIb$_1$III) composed of galactose, galacturonic acid, rhamnose, arabinose, mannose, glucose and glucuronic acid obtained from water-soluble fraction of leaves (*Planta Med.* 1992, *58,* 445); crude polysaccharide fraction S-2A, composed of galactose, galacturonic acid, glucose, rhamnose and arabinose isolated from stems and partially characterised (*Shengwu Huaxue Yu Shengwu Wuli Xuebao* 1992, *24,* 22; *Chem. Abstr.* 1992, *117,* 147206 q); rhizome afforded daucosterin, adenosine, sucrose and β-sitosterol (*Yanbian Yixueyuan Xuebao* 1993, *16,* 132; *Chem. Abstr.* 1994, *120,* 319465 d); a process developed for isolation of virucidal glycoproteins from ginseng (Jpn. 2,36,124 (1990) Feb. 06; *Chem. Abstr.* 1990, *113,* 103373 e); two new polypeptides - RGPI and RGPII - isolated from Chinese red ginseng and characterised as propadecapeptide and pentadecapeptide respectively (*Yaoxue Xuebao* 1991, *26,* 499; *Chem. Abstr.* 1992, *116,* 136086 d); γ-aminobutyric acid, arginine, glutamine, asparagine and proline identified in plant (*Chinese Sci. Bull.* 1991, *36,* 1706; *Chem. Abstr.* 1992, *116,* 262610 h); a tetrapeptide composed of glycine, arginine, glutamine and valine in ratio of 1:1:1:1 identified in alkaline fraction of roots, by HPLC (*Planta Med.* 1994, *60,* 171).

A new polyphenolic compound (II) isolated and its structure elucidated by spectral studies of its permethylated ether (*Koryo Insam Hakhoe Chi* 1990, *14,* 27; *Chem. Abstr.* 1991, *115,* 78595 k); glycoprotein composed of arabinose, rhamnose, mannose, glucose, galactose, glucuronic acid and galacturonic acid isolated (Jpn. 2,45,499 (1990) Feb. 05; *Chem. Abstr.* 1990, *112,* 223249 v); two new lignans - gomisin A and gomisin N - isolated from Korean red ginseng and their structures established (*Arch. Pharmacal Res.* 1990, *13,* 278; *Chem. Abstr.* 1991, *114,* 149997 k; *Koryo Insam Hakhoe Chi* 1991, *15,* 117; *Chem. Abstr.* 1992, *116,* 46108 h); isolation

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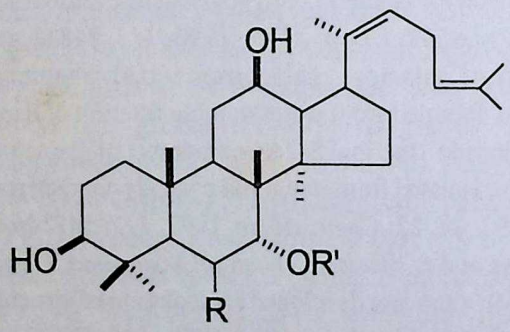
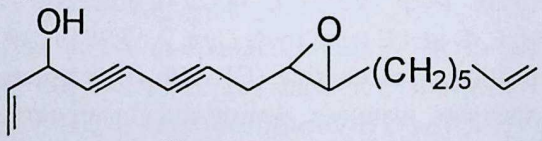
and structure elucidation of two new sesquiterpenoids - panasinsanol A and panasinsanol B - from dried rootlets; ginsenol also obtained (*Proc. Int. Congr. Essent. Oils, Fragrances Flavours* 11th 1989, *5*, 11; *Chem. Abstr.* 1992, *117*, 188233 q); two new minor triterpenes isolated from stems and characterised as 20(R)-dammaran-3β,6α,12β,20,25-pentol and its 6-O-α-L-rhamnosyl(1→2)-O-β-D-glucopyranoside (*Yaoxue Xuebao* 1990, *25*, 297; *Chem. Abstr.* 1990, *113*, 112502 y); senecrassidol isolated from rootlets (*Chem. Pharm. Bull.* 1990, *38*, 1405); a new triterpene (III) isolated from stems and leaves and its structure determined (*Chinese Chem. Lett.* 1992, *3*, 887; *Chem. Abstr.* 1993, *118*, 209392 d); isolation of 3-methoxy-5-(1-O-β-D-glucosyl)heptyl-2(5H)-furanone from callus (Jpn. 2,191,293 (1990) Jul. 27; *Chem. Abstr.* 1991, *114*, 12186 a); α-elemene, ledol, β-gurjunene and α-propyl-2-furanacetaldehyde identified in root essential oil of plant grown in China, Korea and Japan (*Zhongguo Yaoxue Zazhi* 1989, *24*, 590; *Chem. Abstr.* 1990, *113*, 55845 m); determination of β-elemene (15.0), trans-β-farnesene (8.0), β-selinene (8.0), γ-elemene (6.0) and β-gurjunene (6.0%) in root volatile oil (*Zhongguo Yaoxue Zazhi* 1991, *26*, 408; *Chem. Abstr.* 1992, *116*, 190986 k); a nerve growth factor-like immunoreactive substance (*Panax ginseng* NGF) present in root extract (*Biosci., Biotechnol., Biochem.* 1994, *58*, 1638; *Chem. Abstr.* 1994, *121*, 2211851 x).

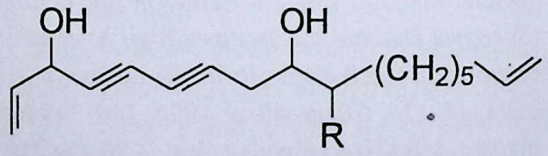
NEW COMPOUNDS



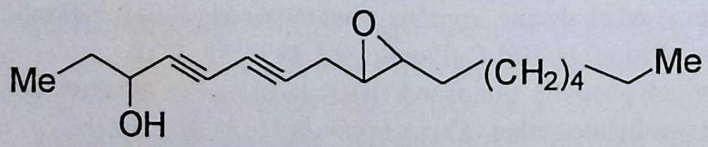
Ginsenoside Rg4
R = H, R' = Glu(2→1)Rha
Ginsenoside F4
R = O-Glu(2→1)Rha, R' = H



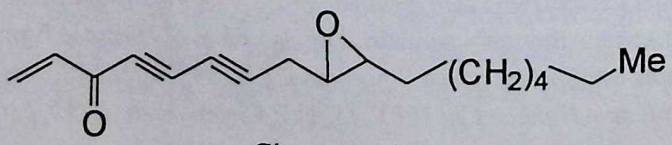
Ginsenoyne A



Ginsenoyne B
R = Cl
Ginsenoyne C
R = OH



Ginsenoyne D



Ginsenoyne E

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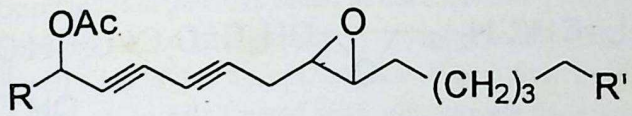
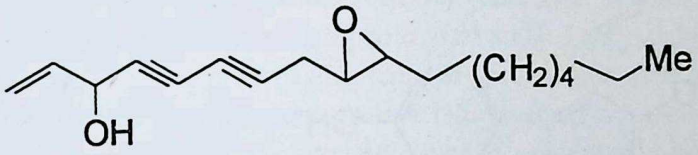
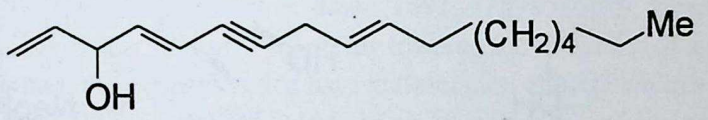


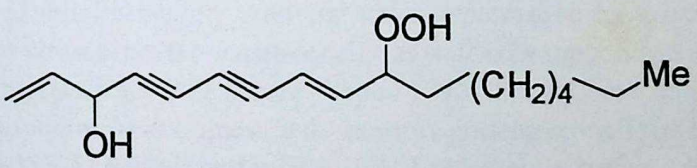
Ginsenoyne F
R,R' = CH=CH$_2$
Ginsenoyne G
R,R' = CH$_2$Me
Ginsenoyne H
R = CH$_2$Me, R' = CH=CH$_2$



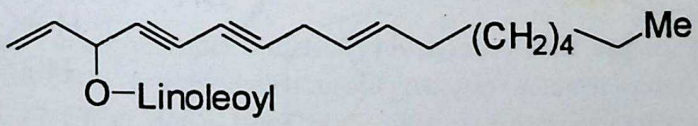
Ginsenoyne I



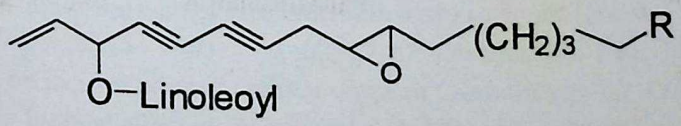
Ginsenoyne J



Ginsenoyne K



Panaxynol linoleate



Panaxydol linoleate
R = CH$_2$Me
Ginsenoyne A linoleate
R = CH=CH$_2$

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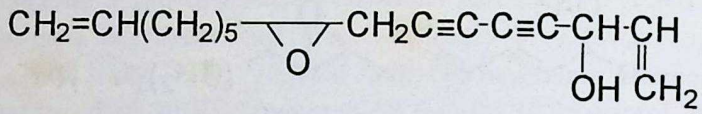

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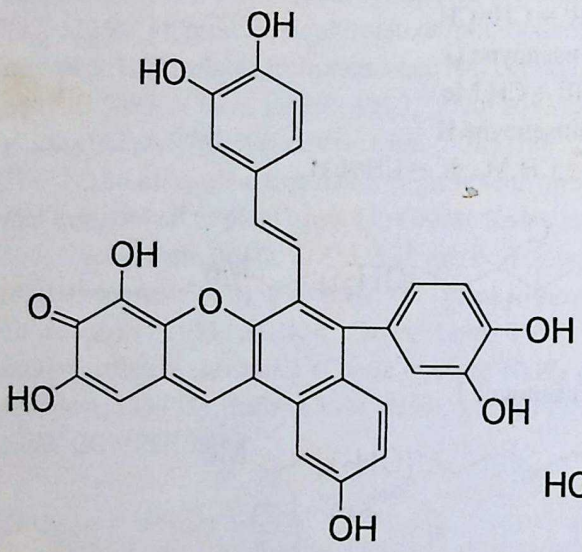
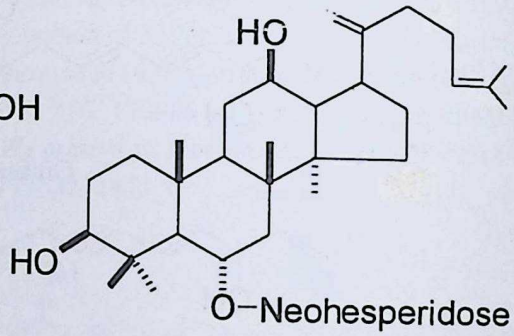
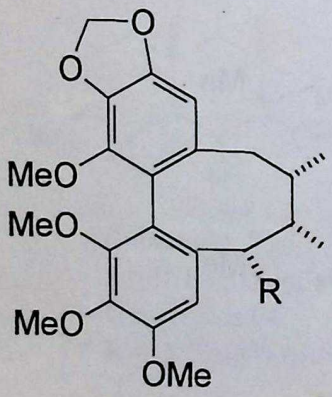


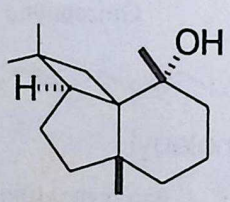
II



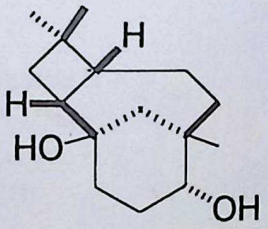
III



Gomisin A
R = OH
Gomisin N
R = H



Panasinsanol A



Senecrassidiol

BIOLOGICAL ACTIVITY

Ginsenosides administered i.v. to rabbits 15 min after smoke inhalation injury, alleviated increase of platelet aggregation and reduced increase in pulmonary vascular permeability and pathological lesions in trachea and lung. In addition, ginsenosides increased plasma PG12 level (*J. Med. Coll. PLA* 1989, *4*, 282; *Chem. Abstr.* 1990, *113*, 17724 p); effect of ginsenosides on

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macrophages in subcutaneous connective tissue in mice studied. They caused increase in number of macrophages and activity of acid phosphatase, cytochrome oxidase and succinate dehydrogenase but no such effects observed at higher doses (*Baiqiuen Yike Daxue Xuebao* 1989, *15,* 545; *Chem. Abstr.* 1990, *113,* 52240 z); in rats treated with ginsenoside from stems and leaves, specific binding of glucocorticoid in hippocampus was decreased by 48.2% and content of cAMP was also decreased. Thus, hippocampus may be the target organ for action of ginsenosides in regulating action of pituitary adrenal axis through their effect on glucocorticoid receptor (*Baiqiuen Yike Daxue Xuebao* 1990, *16,* 6; *Chem. Abstr.* 1991, *114,* 156962 y); ginseng saponins administered intracerebrally and intrathecally to mice, antagonised significantly analgesic effect of clonidine. Its i.p. administration inhibited development of clonidine induced analgesic tolerance and enhanced analgesic effect of clonidine on second and fifth day (*Saengyak Hakhoe Chi* 1990, *21,* 103; *Chem. Abstr.* 1990, *113,* 184597 f); ginseng saponin (0.05 and 0.1 g/kg) reduced caffeine-induced increase in locomotor activity in mice. It also reduced norepinephrine and dopamine levels in whole brain and cortex in dose-dependent manner (*Koryo Insam Hakhoe Chi* 1990, *14,* 399; *Chem. Abstr.* 1991, *115,* 604 t); red ginseng saponin prevented experimentally-induced hyperkeratosis possibly by controlling enzyme activities involved in cellular metabolism (*Koryo Insam Hakhoe Chi* 1990, *14,* 265; *Chem. Abstr.* 1991, *115,* 85368 s); ginsenosides from stems and leaves, administered i.p. or orally, markedly lowered the frequency of micronuclei in mouse bone marrow cells and, thus, considered to have antimutation effect (*Baiqiuen Yike Daxue Xuebao* 1991, *17,* 140; *Chem. Abstr.* 1992, *117,* 104214 y); ginsenosides suppressed lesion of cultured cells induced by HSV-1, HSV-2, ADV-3 and VSV. Individual ginsenosides Rb1, Rb2, Rb3, Ro and Re also showed antiviral activity. Antiviral action appears to be due to inhibition of absorption and penetration of viruses into the sensitive cells, as well as by suppression of replication but not due to direct killing (*Baiqiuen Yike Daxue Xuebao* 1992, *18,* 24; *Chem. Abstr.* 1993, *119,* 62484 v); stem and leaf saponins from Chinese and American ginseng showed protection against Herpes simplex 1 virus (HSV 1) *in vitro* and in oral HSV 1 infection in humans. Ginsenosides Rb and Rb2 identified as active principles (*Zhongcaoyao* 1992, *23,* 249; *Chem. Abstr.* 1992, *117,* 103645 c).

Leaf and stem ginsenosides inhibited growth rate and mitotic activity of human gastric carcinoma cells (BGC-823) *in vitro* and increased glycogen content of cells (*Baiqiuen Yike Daxue Xuebao* 1992, *18,* 27; *Chem. Abstr.* 1993, *119,* 62581 z); ginsenosides decreased lactic acid and increased lactate dehydrogenase and ATP in ischemic brain of Mongolian gerbils, indicating they could improve abnormal energy metabolism in brain ischemia (*Baiqiuen Yike Daxue Xuebao* 1992, *18,* 538; *Chem. Abstr.* 1993, *119,* 62909 n); ginsenosides Rb2, Rc, Re and Rg1, had stimulatory effect on over-expressed cellular chicken C-src protein tyrosine kinase in NIH 3T3 cells; Rg1 showing highest effect at 16.7 μg/ml. Inhibitors of protein or RNA synthesis blocked activation of the enzyme (*Arch. Pharmacal Res.* 1993, *16,* 114; *Chem. Abstr.* 1994, *120,* 182964 u); protective effect of ginsenosides on ischemia-reperfusion injury in rat brain studied. It was found that they increased cerebral blood flow, reduced Ca^{2+} accumulation and K^{+} loss in cerebral cortex and hippocampus during reperfusion, and promoted recovery of duration of autonomic

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respiration and electroencephalogram activity (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1994, *8*, 7; *Chem. Abstr.* 1994, *121*, 73364 y); stem and leaf ginsenosides given i.p., reduced sperm abnormalities induced by mitomycin C in mice, which indicated they possess antimutation activity (*Baiqiuen Yike Daxue Xuebao* 1994, *20*, 115; *Chem. Abstr.* 1994, *121*, 221884 k); ginsenosides did not induced sister chromatid exchange (SCE) but frequency of SCE induced by mitomycin C (MMC) in mouse spermatogonia was reduced significantly if ginsenosides and MMC given i.p. simultaneously, indicating that ginsenosides have protective effect on damage of genetic material in genital cells (*Baiqiuen Yike Daxue Xuebao* 1994, *20*, 227; *Chem. Abstr.* 1994, *121*, 272133 x).

Ginsenosides Rb2, Rc, Rd, Rg2, Rg3 and Ro showed antiarrhythmic activity in rats (*Shenyang Yaoxueyuan Xuebao* 1992, *9*, 103; *Chem. Abstr.* 1993, *118*, 487 u); ginsenosides Rg, Rb, Rg1 and Rb1 inhibited rat kidney microsome Na^+, K^+-ATPase activity *in vitro* and their IC50 were 402.0, 74.0 μg/ml, 15.0 and 50.0 μmol respectively. Ginsenosides Rb, Rb1 and Rg1 were reversible inhibitors of Na^+, K^+-ATPase; K^+ antagonised inhibitory effect of Rg1 and Rb1 but Na^+ did not (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1990, *4*, 142; *Chem. Abstr.* 1990, *113*, 165128 n); ginsenosides Rb1 and Rg1 inhibited vitamin C-NADPH and Fe^{2+}-cysteine-induced lipid peroxidation of rat liver and brain microsomes, the former being more potent than the latter. Inhibitory effect of Rb1 on vitamin C-NADPH-induced lipid peroxidation was similar to that of vitamin E at same concentration (*Zhongguo Yixue Kexueyuan Xuebao* 1989, *11*, 460; *Chem. Abstr.* 1990, *113*, 509 z); ginsenosides Rb1 and Rg1 inhibited lipid peroxidation of rat liver and brain microsomes and Rb1 at final concentration of 0.1 to 1.0 mmol could scavenge O^2- induced by liver microsome-NADPH-gossypol system. *In vivo* Rb1 (25.0 and 50.0 mg/kg/day X 3, i.p.) inhibited MDA formation in liver homogenate of rats by 26.8% and increased activities of catalase and GSH peroxidase by 47.2 and 96.4% respectively (*Chinese Med. J.* 1991, *104*, 395; *Chem. Abstr.* 1991, *115*, 248056 e); antitumor effect of ginsenosides Rb1 and Rg1 investigated on human hepatoma cell lines (PLC/PRF/5, Hep-G2), human liver cells and human pancreatic cancer line (BXPC-3). Concentration of Rb1 and Rg1 required for 50% inhibition of growth of PLC/PRF/5 cells was 1.0 mg/ml (*Cancer Lett.* 1994, *86*, 91; *Chem. Abstr.* 1994, *121*, 292196 y).

Injection of 20.0 μg/ml Rb1 into lateral hypothalamus (LH) of anaesthetised rats increased mean arterial pressure significantly ($P < 0.01$) at 45 min, suggesting that LH is one of the sites of action of Rb1 in central nervous system responsible for elevation of blood pressure (*Baiqiuen Yike Daxue Xuebao* 1993, *19*, 136; *Chem. Abstr.* 1993, *119*, 131199 v); ginsensoside Rb1 showed calcium antagonistic activity in binding of ^3H PN200-110 to dihydropyridine receptor from rabbit skeletal muscle transverse tubule membranes, its IC50 being 120.0 mg/ml; Rgl was devoid of this activity (*Beijing Yike Daxue Xuebao* 1994, *26*, 90; *Chem. Abstr.* 1994, *121*, 246183 u); immunomodulatory activity of ginsenoside Rg1 in mice using sheep red blood cells as antigen studied. Administration of ginsenoside Rg1 (10.0 mg/kg) for three consecutive days before immunisation, increased the number of spleen plaque-forming cells, the titer of serum haemagglutinins as well as the number of antigen reactive T-cells. It also increased number of T-helper cells with respect to whole T-cells and splenocyte natural killer activity (*Jap. J. Pharmacol.* 1990, *54*, 447); ginsenoside Rg1 (1.0 mg/kg, i.p.) prevented urinary protein excretion, elevation

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of serum cholesterol and histopathological changes such as hypercellularity and adhesion in rats, whereas ginsenoside Rb1 only inhibited histopathological parameters. Rg1 inhibited platelet aggregation *in vivo* and enhanced renal blood flow on first day, suggesting that it exerts antinephritic action via increased renal blood flow (*Nippon Yakurigaku Zasshi* 1991, *97,* 127; *Chem. Abstr.* 1991, *114,* 156857 t); ginsenoside Ral increased activity of recombinant human tumor necrosis factor (rh-TNF-α) *in vitro* 134-fold. It also increased antitumor activity of rh-TNF-α *in vivo*, showing that Ral would be a good synergist to rh-TNF-α (*Zhonghua Weishengwuxue He Mianyixue Zazhi* 1991, *11,* 238; *Chem. Abstr.* 1991, *115,* 270153 f); daily i.p. administration of ginsenoside Rb2 for several days in rats increased content of tissue ATP and adenine nucleotide, decreased AMP and improved energy charge. Thus, it changed the pattern of metabolism by activating the ATP supply system (*J. Pharm. Pharmacol.* 1991, *43,* 290); ginsenoside Rb2 (10.0 to 500.0 μg/mouse, i.v.) showed remarkable dose-dependent anti-angiosenic effect in mice, but its intratumoral or oral administration markedly inhibited both neovascularisation and tumor growth. Multiple administration of Rb2 after inoculation of B16-BL6 melanoma cells significantly inhibited lung metastasis (*Biol. Pharm. Bull.* 1994, *17,* 635; *Chem. Abstr.* 1994, *121,* 73260 m); ginsenoside Re inhibited electrophysiological activity of rat atria (*Planta Med.* 1994, *60,* 192); study of mechanism of antitumor action of ginsenoside Rh2 and role of gene C-myc in cell proliferation in cultured B16 melanoma, 3LL, Meth-A and HL-60 cell lines, showed that Rh2 does not act on directly on expression of C-myc but regulates it at the level of protein synthesis (*Kanazawa Ika Daigaku Zasshi* 1990, *15,* 163; *Chem. Abstr.* 1990, *113,* 224236 w); ginsenoside Ro (0.01, 0.05 and 0.2 g/kg, p.o.) inhibited increase in vascular permeability induced by acetic acid in mice, and reduced acute oedema in paw of rats induced by compound 48/80 or carrageenin. However, it did not suppress developing adjuvant-induced oedema in arthritic rats (*Planta Med.* 1990, *56,* 19); ginsenoside Ro (0.2 g/kg, p.o.) given 1 hr before administration of galactosamine (0.4 g/kg, i.p.) to rats, reduced hepatitis significantly as evaluated by glutamic-oxalic and glutamic-pyruvic transaminases. Ginsenoside Ro has LD50 of >1.0 g/kg, i.p., in mice (Jpn. 4,05, 235 (1992) Jan. 09; *Chem. Abstr.* 1992, *116,* 158902 u); ginsenoside Rx increased neurite extension in cultured new born mice cerebella *in vitro* (*Shenyang Yaoxueyuan Xuebao* 1993, *10,* 47; *Chem. Abstr.* 1994, *120,* 23447 m).

Panaxynol, panaxydol and panaxytriol inhibited growth of various cell lines cultured *in vitro,* in concentration-dependent fashion; inhibitory activity being much stronger against malignant cells than normal cells (*Chem. Pharm. Bull.* 1990, *38,* 3480); panaxadiol and panaxatriol decreased action potential parameters in cultured rat ventricular myocytes in dose-dependent manner, suggesting that they inhibit heart action potential via calcium channel blocking (*Zhongguo Zhongyao Zazhi* 1992, *17,* 172; *Chem. Abstr.* 1992, *116,* 248159 m); panaxytriol given to normal mice for 6 consecutive days (5.0, 10.0 and 20.0 mg/kg, i.p.) suppressed increase of body weight in dose-dependent manner but no significant changes were observed in humoral immune responses. Thus, panaxytriol has no deterimental effect on immune function in normal mice (*Korean J. Toxicol.* 1990, *6,* 13; *Chem. Abstr.* 1992, *117,* 62506 n); panaxytriol (0.04 g/kg, i.m.) inhibited tumor growth in C57BL/6 mice transplanted with B16 melanoma (*Gan to Kagaku Ryoho* 1990,

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17, 1045; *Chem. Abstr.* 1990, *113*, 144987 b); panaxatriol ginsensoside (1.0 mg/animal/day) administred s.c. in cyclophosphamide-induced myeloimmunosuppression model of mice, for 3 days prior to cyclophosphamide injection, partially restored decreased in bone marrow cells and their activity. Spleen lymphocyte response to con A was reactivated, indicating inhibition of myeloimmuno-suppression (*Zhongguo Mianyixue Zazhi* 1991, *7*, 312; *Chem. Abstr.* 1994, *120*, 69015 x); panaxatriol ginsenoside increased protein synthesis by 55.0% and IL-6 activity by 100% in PHA-activated human lymph node cells but did not increase RNA synthesis (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1991, *5*, 38; *Chem. Abstr.* 1991, *114*, 178053 e); panaxatriol enhanced interleukin-6 (IL-6) production in human lymph node cells by promoting IL-6 mRNA translation (*Chinese Med. J.* 1991, *104*, 965; *Chem. Abstr.* 1992, *116*, 227891 d); 1,8-heptadecadiene-4,6-diyne-3,10-diol showed IC50 9.4 μM against 5-lipoxygenase (Jpn. 1,224,367 (1989) Sep. 07; *Chem. Abstr.* 1990, *112*, 164945 u).

Ginseng polypeptide (GPP) (50.0 - 200.0 mg/kg, i.v.) decreased levels of blood sugar and hepatic glycogen in rats without affecting blood total lipids. GPP was also found to decrease experimental hyperglycaemia induced by injection of adrenaline, glucose of alloxan. LD50 of polypeptide was 1.62 g/kg, i.v. in rats (*Koryo Insam Hakhoe Chi* 1990, *14*, 338; *Chem. Abstr.* 1991, *115*, 64504 t; *Yaoxue Xuebao* 1990, *25*, 401; *Chem. Abstr.* 1990, *113*, 184546 p); glycoprotein (4.0 mg/kg, i.v.) given to mice showed much higher carbon clearance (immuno-stimulant) activity than zymosan at 40.0 mg/kg (Jpn. 2,45,499 (1990) Feb. 05; *Chem. Abstr.* 1990, *112*, 223249 v); a tetrapeptide at 3.40 μm caused 20.0% enhancement of proliferation of fibroblast BHK-21 cells (*Planta Med.* 1994, *60*, 171); ginseng polysaccharides (0.05-0.2 g/kg, i.p. or s.c.) reduced levels of blood glucose and liver glycogen in mice, increased content of pyruvic acid but decreased that of lactic acid by weakening lactate dehydrogenase activity. They accelerated oxidative phosphorylation and stimulated release of insulin. Thus, reduction of blood glucose and liver glycogen may be primarily due to increase of carbohydrate utilisation and decreased of glycogenesis (*Zhongguo Yaoli Xuebao* 1990, *11*, 520; *Chem. Abstr.* 1991, *114*, 17393 a); ginseng polysaccharides (0.05-0.2 g/kg, i.p.) administered to normal mice for 7 days resulted in dose-dependent increase of interleukin-2 (IL-2) and of interferon production induced by con A and of splenic natural killer cell activity against YAC-1 target cells. At 0.05 - 0.2 g/kg, i.p. x 14 days, polysaccharide restored level of IL-2 and production and natural killer activity of splenocytes in B16 melanoma-bearing mice (*Hunan Yike Daxue Xuebao* 1991, *16*, 107; *Chem. Abstr.* 1992, *116*, 376 r); polysaccharides antagonised cobra venom factor caused decreases in complements and neutrophil phagocytosis and increase in neutrophil granular substances in cobra venom factor-treated guinea pigs but had no effect in control group (*Zhongguo Yaoxue Zazhi* 1992, *27*, 653; *Chem. Abstr.* 1993, *118*, 225160 g); dencichin enhanced histamine-induced contraction of guinea pig aorta (*Wakan, lyaku Gakkaishi* 1991, *8*, 34; *Chem. Abstr.* 1992, *116*, 34527 f).

P. pseudoginseng Wall. ssp. *himalaicus* Hara (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 531).

A new compound - bis(2-ethylheptyl)phthalate - isolated from leaves along with

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hentriacontane, hexadecyl palmitate, dotriacontanyl palmitate, dotriacontanol, dotriacontanoic acid, oleanolic acid and β-sitosterol (*Indian J. Pharm. Sci.* 1989, *51*, 209).

P. pseudoginseng Wall.ssp. *himalaicus* Hara var. *angustifolius* (Burkill) Li (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 532).

Leaves afforded hentriacontane, dotriacontanyl palmitate, dotriacontanol, dotriacontanoic acid, oleanolic acid and β-sitosterol (*Indian J. Pharm. Sci.* 1989, *51*, 209); a new acylated saponin - pseudoginsenoside RI_2 - isolated from rhizomes and characterised as bis-[oleanolic acid-3-O-β-D-glucuronopyranosyl(2→1)-β-D-xylopyranosyl-4-O-]-phthalate (*Phytochemistry* 1990, *29*, 239).

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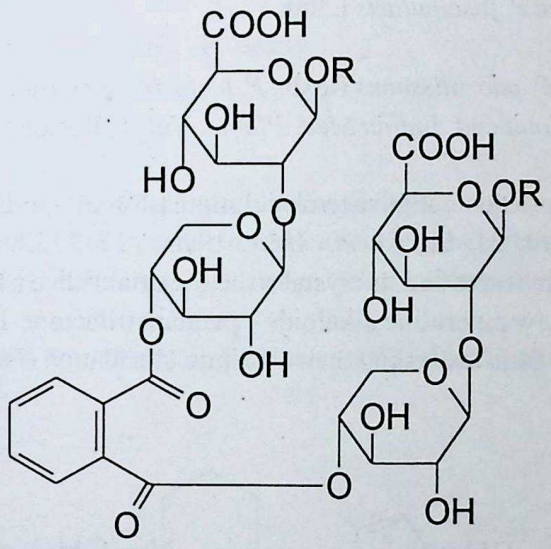

Pseudoginsenoside RI_2
R = Oleanolic acid

P. pseudoginseng Wall. ssp. *himalaicus* Hara var. *bipinnatifidus* (Seem.) Li syn. *Aralia bipinnatifida* (Seem.) Clarke, *Panax bipinnatifidum* Seem. (*bipinnatifidus*) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 533).

Pseudoginsenosides F11, RP1 and RT1, ginenosides Rb1, Rb2, Rb3, Rc, Rd, Re, Rg1 and Rbo and chikusetsusaponins IV and IVa - isolated (*Planta Med.* 1989, *55*, 396); isolation of hentriacontane, dotriacontanyl palmitate, dotriacontanoic acid, triacontanoic acid and oleanolic acid from leaves (*Indian J. Pharm. Sci.* 1989, *51*, 209).

PANCRATIUM (Amaryllidaceae)

P. biflorum Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 533).

Two new acetophenone-O-glucosides isolated from flowering bulbs and pseudo stem

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fluid and characterised as 4,6-dimethoxyacetophenone-2-O-β-D-glucoside and 2,6-dimethoxyacetophenone-4-O-β-D-glucoside; 2,4,6-trimethoxyacetophenone also isolated (*Phytochemistry* 1989, *28*, 3193).

P. zeylanicum L.

Isolation of hippadine, and α- and β-amyrin acetates from dried rhizomes (*Fitoterapia* 1993, *64*, 472).

Distribution: Throughout India, in plains.

PANDANUS (Pandanaceae)

P. amaryllifolius Roxb.; see *P. fascicularis* Lamk.

P. fascicularis Lamk. syn. *P. odoratissimus* Roxb., *P. tectorius* auct. (non Soland. ex Parkinson), *P. amaryllifolius* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi,1994, P. 534).

β-Sitosterol, β-sitostenone, stigmasterol and stigmast-4-en-3,6-dione isolated (*Zhongguo Yaoke Daxue Xuebao* 1990, *21*, 51; *Chem. Abstr.* 1990, *112*, 213905 s); a new alkaloid - pandamarine - isolated from leaves and its crystal structure established (*Aust. J. Chem.* 1992, *45*, 1903); isolation of three new piperidine alkaloids - pandamarilactone 1, pandamarilactone 31 and pandamarilactone 32 - from leaves and their structure elucidation (*Phytochemistry* 1993, *34*, 1159).

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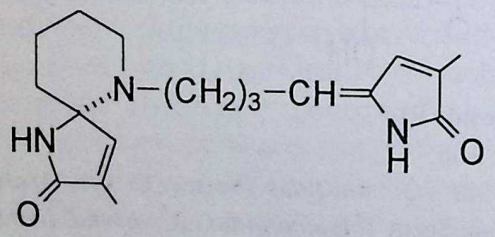
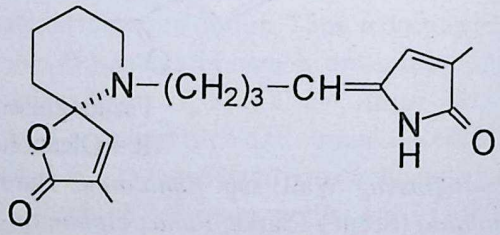
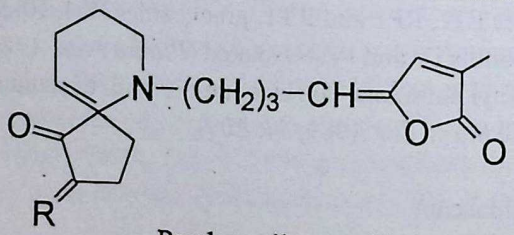


Pandamarine



Pandamarilactone-1



Pandamarilactone 31
R = Me,OMe
Pandamarilactone 32
R = CH_2

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P. odoratissimus Roxb.; see *P. fascicularis* Lamk.

P. tectorius Soland. ex Parkinson; see *P. fascicularis* Lamk..

PANICUM (Poaceae)

P. coloratum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 470).

Saponins showed hepatotoxic activity.

Saponins yielding diosgenin and yamogenin isolated (*Vet. Hum. Toxicol.* 1990, *32,* 314; *Chem. Abstr.* 1991, *114,* 58847 v).

P. italicum L.; see *Setaria italica* (L.) P. Beauv.

PANISEA (Orchidaceae)

P. uniflora (Lindl.) Lindl. syn. *Coelogyne uniflora* Lindl.

A new steroidal ester - uniflorin - isolated and characterised as 24-ethyl-4α,14α,24-trimethyl-9β,19-cyclocholest-25-en-3β-yl cis-p-hydroxycinnamate (*Phytochemistry* 1990, *29,* 2717).

Distribution: Himalayas, from Nepal to Bhutan and Khasi Hills, alt. 900-1500 m.

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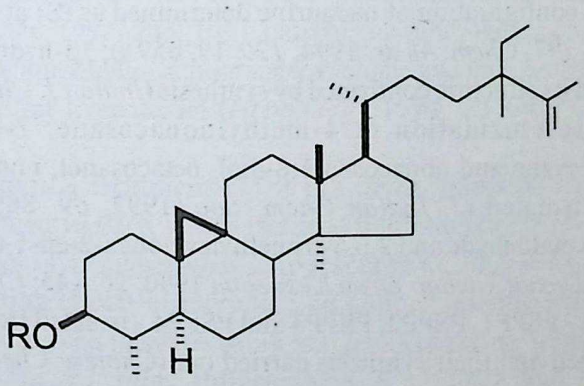

Uniflorin
R = Cis-p-hydroxycinnamoyl

PAPAVER (Papaveraceae)

P. orientale L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 534).

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Cortuberine, N-methylthebainium hydroxide, N-methylisothebainium hydroxide, magnoflorine, oripavine, thebaine, isothebaine and alpinigenine isolated from aerial parts and roots; bracteoline, isoboldine, scoulerine, palmatine, coptisine and papaverrubines A, B, C, D and G also identified (*Collect. Czech. Chem. Commun.* 1991, *56,* 1534; *Chem. Abstr.* 1991, *115,* 203338 g).

P. rhoeas L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, P. 471).

A major alkaloid - (+)rhoeadine - isolated from aerial parts along with allocryptopine, protopine, coulteropine, berberine, coptisine, sinactine, (+)isocorydine, (+)roemerine and (+)rhoeagenine (*Planta Med.* 1989, *55,* 488); synthesis of protopine (*J. Heterocycl. Chem.* 1990, *27,* 623); synthesis of adlumidiceine (*Bull. Pol. Acad. Sci. Chem.* 1991, *39,* 7; *Chem. Abstr.* 1991, *115,* 92657 p).

P. somniferum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, P. 534).

Seeds significantly inhibited benzo[a]pyrene-induced squamous cell carcinoma in stomach of Swiss mice (*Food Chem. Toxicol.* 1992, *30,* 953; *Chem. Abstr.* 1993, *118,* 100782 e).

Isolation and structure elucidation of a new secophthalideisoquinoline alkaloid - narceinone - from dried capsules; narceine also obtained (*Phytochemistry* 1989, *28,* 2002); morphine synthesised (*Synthesis* 1992, 174; *J. Am. Chem. Soc.* 1993, *115,* 11028); a new alkaloid - 5'-O-demethylnarcotine - isolated from poppy straw and its structure determined (*Planta Med.* 1993, *59,* 477); absolute configuration of nadaurine determined as (S) at C-7 by X-ray analysis (*Nat. Prod. Lett.* 1993, *2,* 197; *Chem. Abstr.* 1994, *120.* 192059 s); 3β-hydroxy-9,10-cyclo-26,27-norlanostane isolated and its structure confirmed by synthesis (*Indian J. Chem.* 1991, *30*B, 1010); isolation and structure elucidation of 4-methylnonacosane, 7-pentacosanone, 20-hydroxytricosanylcyclohexane and nonacosan-1,8-diol; octacosanol, nonacosanol, β-sitosterol and its glucoside also isolated (*J. Indian Chem. Soc.* 1992, *69,* 889); 1-pentylfuran, α-isopropylidene-2-furanacetaldehyde and 2,6,6-trimethylcyclohex-2-en-1-ol identified in volatile oil from seeds (*Lanzhou Daxue Xuebao Ziran Kexueban* 1990, *26,* 145; *Chem. Abstr.* 1993, *118,* 165179 h); four peptides - PSPP1, PSPP2, PSPP3 and PSPP4 - isolated from pollen, their amino acid sequences determined and their synthesis carried out (*Chinese Chem. Lett.* 1993, *4,* 213; *Chem. Abstr.* 1994, *120,* 158798 x); antitumor polysaccharides isolated from seeds (Jpn. 1,178,501 (1989) Jul. 14; *Chem. Abstr.* 1990, *112,* 164940 p); a polysaccharide composed of arabinose and galactose in molar ratio of 1:1 isolated from pollen (*Gaodeng Xuexiao Huaxue Xuebao* 1994, *15,* 379; *Chem. Abstr.* 1994, *121,* 129915 y).

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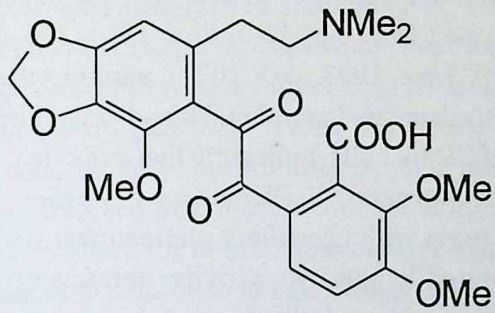

Narceinone

BIOLOGICAL ACTIVITY

Cultured hepatocytes from rats treated with 10.0 μM to 1.0 mM papaverine hydrochloride for 4 to 24 hr, showed significant decrease in cell viability and alkaline phosphatase activity at 8 hr exposure, accompanied by significant lactate dehydrogenase (LDH) leakage (*In Vitro Toxicol.* 1990, *3*, 229; *Chem. Abstr.* 1991, *114*, 221147 c); inhibitory effect of papaverine on contractility of isolated, partially depolarised rabbit papillary muscle seemed to be due to antagonism of Ca^{2+} current. Prolongation of action potential duration by papaverine appeared to be induced by decreased in K^+ conductance (*Chungang Uidaechi* 1991, *16*, 255; *Chem. Abstr.* 1992, *117*, 143121 k); study of effect of papaverine (1.0-100.0 μM) on voltage-dependent Ca^{2+} current examined in isolated smooth muscle cells from guinea pig trachea showed that Ba^{2+} inward current (IBa) through voltage-dependent L-type Ca^{2+} channel is inhibited in concentration-dependent manner (*J. Pharmacol. Exp. Ther.* 1992, *263*, 194); papaverine inhibited bile acid excretion into bile in presence of infusions of taurocholic, tauroursodeoxycholic and taurodehydrocholic acids in single-pass, isolated perfused rat liver model (*Hepatology* 1994, *20*, 692; *Chem. Abstr.* 1994, *121*, 292726 w).

Chronic morphine treatment (75.0 mg pellet implantation) elicited a variety of immunosuppressive effects in mice, which included inhibition (91.0%) of paw-swelling in picryl chloride-induced delayed type hypersensitivity response (*J. Pharmacol. Exp. Ther.* 1990, *255*, 410); immunomodulating effects of morphine on antigen-specific humoral and cell-mediated immune responses determined in swine using antigens viz. swine herpes virus (PRV), *Brucella abortus and Escherichia coli* pilus antigens K88, K99, 987P and F41. Chronic morphine administration did not impair induction of humoral immune responses to bacterial or viral antigens. Morphine treatment also did not alter resistance of immunised swine to PRV infection. In contrast, cutaneous immune responses to the antigen, dinitrofluorobenzene, in morphine-treated swine was markedly suppressed (*J. Pharmacol. Exp. Ther.* 1992, *260*, 581); morphine suppressed primary humoral immune responses, caused thymic hypoplasia and suppressed natural killer activity in animal models. This suppression was not primarily mediated by direct action of morphine on immune system but indirectly (*J. Pharmacol. Exp. Ther.* 1991, *262*, 923); single injection of morphine in rats suppressed mitogenic response of splenic lymphocytes, production of interleukin-

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2 and interferon by splenic lymphocytes and splenic natural killer cell activity in dose-dependent manner, indicating that immunomodulatory effects are dose-dependent, compartment specific and antagonised by naltrexone (*Adv. Exp. Med. Biol.* 1993, *335,* 53; *Chem. Abstr.* 1994, *120,* 45850 q; *J. Pharmacol. Exp. Ther.* 1993, *265,* 1071); administration of morphine (3.2 mg/kg) daily to monkeys significantly decreased peripheral blood mononuclear cell natural killer activity and percentage of $CD8^+$ and $CD16^+$ cells, indicating that daily treatment with relatively low dose (3.2 mg/kg) affects immunocompetence (*J. Pharmacol. Exp. Ther.* 1993, *267,* 9); administration of morphine (10.0 mg/kg) to rat with or without pretreatment with steroid receptor antagonist RU486 (20.0 mg/kg), inhibited lymphocyte activity significantly. Result suggest that factors elaborated by intact pituitary or adrenal glands are not required for acute inhibitory effects of morphine on peripheral blood lymphocytes activity (*J. Pharmacol. Exp. Ther.* 1994, *268,* 1129); morphine, at higher concentrations than that required for inhibition of spontaneously active cells, antagonised stimulation of human granulocytes by tumor necrosis factor or substance P, which would suggest that it significantly down-regulates immunocyte responsiveness to neutral endopeptidase substrates and also to those signal molecules (cytokinase) not metabolised by it. Thus, opiates may be considered to be endogenous signal molecules and this inference is amply supported by their immunosuppressive actions (*Int. J. Immunopharmacol.* 1994, *16,* 329; *Chem. Abstr.* 1994, *120,* 289683 d).

Administration of morphine intrathecally (i.t.) produced dose-dependent analgesia in mice. At higher doses, i.t. morphine induced seizures of hind limbs. Spinal morphine analgesia was attenuated by naloxone, whereas i.t. morphine-induced seizures were not. These result indicate that spinal opioid receptors mediated analgesia but not seizures following i.t. morphine (*Eur. J. Pharmacol.* 1990, *176,* 63); morphine (0.1 and 0.3 mg/kg, i.v.) produced analgesic effect on lesioned hind paw of neuropathic rats, maximum effect was at 15 min post-injection with recovery at 20-25 min. At higher doses (0.6 and 1.0 mg/kg) maximum effect was seen at 20-30 min post-injection with recovery at 50-80 min; analgesic effect was also observed on unlesioned side but was less than on lesioned paw. Effect was almost totally reversed by naloxone. Findings suggest that morphine induces potent anti-nociceptive effects in rats model of neuropathy (*Pain* 1991, *47,* 65; *Chem. Abstr.* 1992, *116,* 51321 b); analgesic effects and colonic temperature changes by administration of morphine sulphate (2.5, 5.0 and 10.0 mg/kg, i.v.) determined in rats at 30 min intervals (*J. Pharmacol. Exp. Ther.* 1991, *258,* 511); study of analgesic and hyperthermic effects of morphine (5.0 and 10.0 mg/kg, i.v.) in age-matched male spontaneously hypertensive (SHR) and normotensive Wistar-Kyoto rats (WKY) indicated that enhanced pharmacological responses in SHR rats in comparison to WKY rats may be related to higher density of opiate receptors in brain and not to pharmacokinetics in serum (*J. Pharmacol. Exp. Ther.* 1991, *261,* 290); acute morphine treatment altered packed cell volume (PCV), haemoglobin (Hb), serum glucose and carbamide-nitrogen (CN) levels which were reversed by naloxone. Acute tolerance developed in PCV, Hb and CN values (*Acta Physiol. Hung.* 1991, *78,* 11; *Chem. Abstr.* 1992, *116,* 51352 n); study of morphine (0.1, 1.0 and 5.0 mg/kg, s.c.) on development of neurogenic pain syndrome in rats after sciatic nerve dissection showed that morphine initially arrests development of pain

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syndrome but later intensifies its course (*Eksp. Klin. Farmakol.* 1993, *56,* 11; *Chem. Abstr.* 1994, *120,* 289968 a); morphine produced dose-related shortening of low-intensity thermally-evoked tail avoidance response (LITETAR) (hyperalgesia) when microinjected into dorsal posterior mesencephalic tegmentum of conscious rats, at higher dose hyperalgesic effect was diminished and LITETAR (analgesia) was prolonged (*Pharmacol. Biochem. Behav.* 1994, *47,* 197; *Chem. Abstr.* 1994, *120,* 45843 q); continuous 8-days administration of morphine (450.0 μg/ml/h, s.c.) sensitised rats to morphine-induced stimulation of locomotion, whereas its continuous administration for 10 days desensitised the animals to morphine-induced (3.0 mg/kg) analgesia. Thus, chronic actions of morphine according to function tested did not result in cross-sensitization (locomotion) or cross-tolerance (nociception) (*Eur. Neuropsychopharmacol.* 1994, *4,* 137; *Chem. Abstr.* 1994, *121,* 195603 w).

Effect of i.v. morphine on spinal nociceptive flexor reflex was examined in decerebrate, unanaesthetised rats in which spinal cord was acutely or chronically transected. In acutely spinalised rats morphine (i.v.) depressed flexor reflex in dose-related manner (ED50 1.4 mg/kg). In rats in which spinal cord was transected 1-3 days prior to i.v. administration of morphine, similar depressive effect was observed (ED50 1.1 mg/kg). However, 4 to 6 days after spinalisation there was 4-fold increase in depressive effect; sensitivity to morphine was further increased 7 to 10 days post-spinalisation, with ED50 of 0.17 mg/kg. This suprasensitivity was maintained upto 30 to 60 days (*Eur. J. Pharmacol.* 1990, *191,* 407); morphine infusion at constant rate of 14.0 mg/kg/hr in rats caused loss of righting reflex by 2.5 hr, which began to decline at 5 hr and animals recovered righting reflex by 9 hr despite continuing morphine infusion (*Anesth. Analg.* 1991, *73,* 619; *Chem. Abstr.* 1992, *116,* 634 y); morphine can affect the content of cAMP and/or cGMP in mammalian brain. It decreased cAMP in rat spinal cord *in vivo* and *in vitro* and this effect could be completely blocked by naloxone while concentration of cGMP in spinal cord was unchanged (*Shengli Xuebao* 1991, *43,* 389; *Chem. Abstr.* 1992, *116,* 166093 w); studies on morphine-induced release of tumor necrosis factor (TNF)-α from murine neonatal microglia suggest that morphine primes microglia for enhanced production of TNF-α which could alter several functional activities of these cells within the brain (*J. Pharmacol. Exp. Ther.* 1994, *269,* 198); dose-response curves of morphine at different temperatures in right atria of rat were studied. Maximal negative chronotropic effect induced was 11.0% at 37° and 20.0% at 30°, but, when temperature was increased to 40°, positive chronotropic effect was observed which was antagonised by naloxone (*Pharmacology* 1992, *44,* 165; *Chem. Abstr.* 1992, *116,* 143776 d); morphine decreased by 10.0% auricular chronotropism in isolated right atria of rat (*Gen. Pharmacol.* 1992, *23,* 1135; *Chem. Abstr.* 1993, *118,* 73573 d).

Effect of morphine (1.0-2.0 mg/kg, i.v.) on depressor, pressor and biphasic blood pressure responses evoked by sciatic nerve stimulation studied in anaesthetised cats. It produced marked attenuation of depressor and some facilitation of pressor responses (*Indian J. Physiol. Pharmacol.* 1991, *35,* 125); morphine (1.0 mg/kg, i.v.) in conscious pigs produced immediate but small increase in cardiac output and substantial increase in heart rate, mean systemic and pulmonary arterial pressure and left and right ventricular work. It also caused gradual increase in ventilatory

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rate and rapid increase in tidal volume, expired and alveolar ventilation and ventilation perfusion ratio (*Am. J. Physiol.* 1991, *261*, 1286; *Chem. Abstr.* 1992, *116*, 15759 s); morphine (0.5 mM) caused significant decrease in maximum rate of depolarisation in guinea pig papillary muscle. At high concentration (5.0 mM) it decreased amplitude and prolonged duration of action potential. Naloxone (0.1 μM) partially antagonised cardiac electrophysiological effects of morphine. Results suggest that electrophysiological effects may be due to interaction with opioid receptors (*J. Pharm. Pharmacol.* 1992, *44*, 275); morphine (0.1 - 2.0 mg/kg, p.o. or s.c.) inhibited acidified ethanol-induced gastric damage in rats in dose-dependent manner. Morphine (1.0 mg/kg, s.c.) also reduced ethanol-induced enhanced vascular permeability of gastric mucosa (*Arch. Int. Pharmacodyn. Ther.* 1990, *306*, 170); the effects of morphine on gastric secretion, barrier mucous and mucosal lesions were studied in pylorus-ligated rats treated with ulcerogenic agents, indomethacin, aspirin or taurocholic acid. Morphine decreased gastric acid secretion and suppressed aspirin and taurocholic acid-induced, but not indomethacin-induced, mucosal lesions, thereby suggesting that ulcerogenic mechanisms of indomethacin and other agents are not identical (*Eur. J. Pharmacol.* 1991, *192*, 271); study of time course of suppression of hepatic and splenic phagocytosis after subcutaneous implantation of morphine sulphate pellets (75.0 mg) indicated that maximum suppression of hepatic phagocytosis (67.0%) occurred 18 hr after implantation, and that of splenic phagocytosis (41.0%) occurred at 12 hr. Results suggest that morphine sulphate suppresses hepatic phagocytosis primarily through opiate receptor-mediated mechanism, whereas splenic phagocytosis is suppressed secondarily through a glucocorticoid receptor mechanism (*J. Pharmacol. Exp. Ther.* 1993, *267*, 357).

Chronic morphine was found to decrease levels of insulin-like growth factor by 40.0% in ventral tegmental area of rat brain and 30.0% in plasma (*Ann. N. Y. Acad. Sci.* 1993, 692; *Chem. Abstr.* 1993, *119*, 262351 m); action of morphine on responses evoked by electrical field stimulation or acetylcholine in isolated guinea pig bronchial muscle was studied. Electrical field stimulation evoked a biphasic contraction, consisting of cholinergically-mediated fast contraction followed by non-cholinergically-mediated slow contraction. Morphine caused concentration-dependent inhibition of non-cholinergic contraction. Submaximal contraction of bronchial muscle evoked by exogenous acetylcholine (2.0 μM) was not inhibited by morphine (100.0 μM), rather it was augmented (*J. Pharm. Pharmacol.* 1990, *42*, 214); effects of morphine on smooth muscle of isolated vas deferens of Sprague-Dawley and Wistar rats studied. Morphine produced pre- and post-synaptic effects on contractile activity of vas deferens, Sprague Dawley rats being more sensitive than Wistar rats (*Comp. Biochem. Physiol., Comp. Pharmacol. Toxicol.* 1991, *100C*, 349; *Chem. Abstr.* 1992, *116*, 51408 k); morphine added *in vitro* to mouse spleen cells inhibited mitogen responses. Naloxone and naltrexone antagonised the effect of morphine (*Adv. Exp. Med. Biol.* 1991, *288*, 203; *Chem. Abstr.* 1992, *116*, 76207 g); bone marrow cells from mice implanted with morphine pellets for 72 hr showed 65.0% decrease in their response to macrophage colony stimulating factor. In contrast, chronic morphine treatment had no effect on response of bone-marrow cells to granulocyte/macrophage colony stimulating factor (*Eur. J. Pharmacol.* 1991, *195*, 359); morphine (20.0 μg/20.0 μl, i.c.v.) in conscious rats significantly increased urine output

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3 hr after injection. Morphine injection also increased ten-fold plasma atrial natriuretic factor level. Thus, diuresis induced by i.c.v. administration of morphine is due to enhanced release of atrial natriuretic factor (*Eur. J. Pharmacol.* 1993, *242*, 7); acute or repeated systemic injection of morphine in mice and Sprague-Dawley rats enhanced locomotor activity (*J. Pharmacol. Exp. Ther.* 1992, *261*, 484); morphine causes selective increase in intake of dietary fat by rats given ad lib access to separate sources of carbohydrate, fat and protein or to carbohydrate/protein diet. Generally, morphine (0.2 and 10.0 mg/kg) increased carbohydrate intake in carbohydrate-preferring rats, and fat intake in fat-preferring rats, suggesting that the effect is to increase intake of preferred diet (*Pharmacol. Biochem. Behav.* 1990, *37*, 207; *Chem. Abstr.* 1990, *113*, 224490 z); systemic morphine (5.0 mg/kg, i.v.) did not block immunoreactive neurokinin A release in dorsal spinal cord of barbiturate anaesthetised spinal cats (*Brit. J. Pharmacol.* 1991, *103*, 1871); in rats morphine reduced viability of lymphocytes in peripheral blood by 34.0%, in spleen by 14.0% and in thymus by 18.0% (*Acta Univ. Palacki Olomuc., Fac. Med.* 1992, *134*, 43; *Chem. Abstr.* 1994, *121*, 246094 r); pretreatment of rats with morphine reduced yawning induced by bromocriptine, physostigmine or pilocarpine in a dose-dependent manner (*Brit. J. Pharmacol.* 1991, *105*, 675); a polysaccharide from seeds showed antitumor activity in mice bearing yoshida sarcoma (Jpn. 1,178,501, (1999) Jul. 14; *Chem. Abstr.* 1990, *112*, 164940 p).

PARACALYX (Papilionaceae)

P. scariosus (Roxb.) Ali syn. *Cylista scariosa* Roxb. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, P. 86).

Two new prenylated flavonoids - scariosin and isorhynchospermin - isolated from leaves and their structures established; in addition, quercetin, kaempferol, its 3-O-rutinoside and rutin isolated (*J. Nat. Prod.* 1992, *55*, 1152; *Iran J. Chem. Chem. Eng.* 1992, *11*, 20; *Chem. Abstr.* 1993, *118*, 56139 z).

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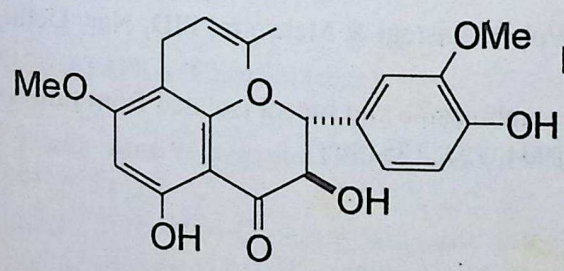
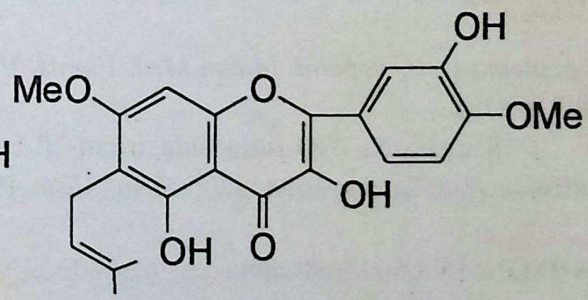


Scariosin



Isorhynchospermin

PARAMIGNYA (Rutaceae)

P. monophylla Wight (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, P. 186).

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Isolation of four tirucalladienes - 3-oxotirucalla-7,24-dien-23-ol, 3-oxotirucalla-7,24-dien-21,23-diol and their 3β-hydroxy derivatives - from fruits together with flindissone and deoxyflindissone (*Phytochemistry* 1991, *30*, 1231).

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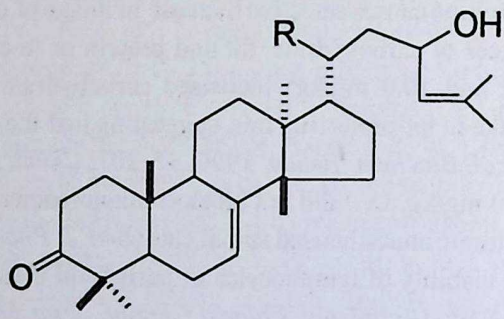

3-Oxotirucalla-7,24-dien-23-ol
R = Me
3-Oxotirucalla-7,24-dien-21,23-diol
R = CH_2OH

PARKIA (Mimosaceae)

P. biglandulosa Wt. & Arn.

Bo. - Chenduphul; Kan. - Sivalinga mara.

A new saponin isolated from seed bran and characterised as 3-O-β-D-glucosyl(1→4)-β-D-glucosyl-olean-12-ene (*Fitoterapia* 1993, *64*, 282).

Distribution : Native to Malaya, introduced into Indian gardens and as avenue tree.

PARKINSONIA (Caesalpiniaceae)

P. aculeata L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p 538).

Scutellarein-7-O-rutinoside, tricin-7β-L-arabinoside and lupeol isolated from flowers (*J. Chem. Res., Synop.* 1994, 320; *Chem. Abstr.* 1994, *121*, 175199 r).

PARSONSIA (Apocynaceae)

P. alboflavescens (Dennst.) Mabberley syn. *P. helicandra* Hook. & Arn., *P. spiralis* Wall. ex G.Don, *P. laevigata* (Moon) Alston (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 186).

A pyrrolizidine alkaloid - parsonsianine - isolated from leaves and its macrocyclic structure composed of retronecine, (2S,3R)2,3-dihydroxy-2-ethylbutanoic acid and (2R,3S)2,3-

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dihydroxy-2-isopropylbutanedioic acid elucidated by X-ray studies (*Chem. Pharm. Bull.* 1990, *38*, 2127).

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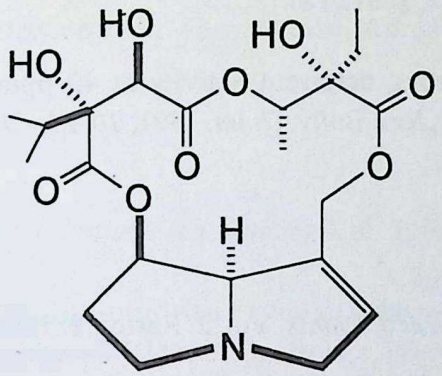

Parsonsianine

P. helicandra Hook. & Arn.; see *P. alboflavescens* (Dennst.) Mabberley

P. laevigata (Moon) Alston; see *P. alboflavescens* (Dennst.) Mabberley

P. spiralis Wall. ex G.Don; see *P. alboflavescens* (Dennst.) Mabberley

PARTHENIUM (Asteraceae)

P. hysterophorus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 538).

Essential oil contained sesquiterpenes (70.0) and monoterpenes (15.0%); bornyl acetate and phenylacetonitrile identified as main constituents (*J. Indian Counc. Chem.* 1987, *3*, 1; *Chem. Abstr.* 1990, *112*, 52158 h); crystal structure of parthenin (*Cryst. Res. Technol.* 1994, *29*, 373; *Chem. Abstr.* 1994, *121*, 35894 p).

PASSIFLORA (Passifloraceae)

P. edulis Sims. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 515).

Luteolin-6-O-chinovoside and luteolin-6C-fucoside identified in leaves by HPLC (*Phytochemistry* 1991, *30*, 3486); β-ionyl-β-D-glucoside identified in fruits (*Nat. Prod. Lett.* 1994, *2*, 227; *Chem. Abstr.* 1994, *120*, 319474 f).

P. foetida L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 539).

Ermanin, 5,3'-dihydroxy-7,4'-dimethoxyflavanone, 5-hydroxy-7,4'-dimethoxy-

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flavanone, 4'-O-methylapigenin, 7,4'-di-O-methylapigenin, 7,3,3'- and 7,3,4'-tri-O-methylquercetins, 3,3'-di-O-methylquercetin, 3,7,4'-tri-O-methylkaempferol and 7,3'-di-O-methylkaempferol isolated from resin (*Phytochemistry* 1991, *30*, 153; *Rev. Boliv. Quim.* 1991, *10*, 25; *Chem. Abstr.* 1992, *117*, 108124 s).

BIOLOGICAL ACTIVITY

Ermanin showed strong deterrent activity at 40 ppm against *Dione juno* larvae (*Phytochemistry* 1991, *30*, 153; *Rev. Boliv. Quim.* 1991, *10*, 25; *Chem. Abstr.* 1992, *117*, 108124 s).

PASTINACA (Apiaceae)

P. sativa L. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 517).

An arabinan isolated and its partial structure determined (*J. Agric. Food Chem.* 1990, *38*, 387; *Chem. Abstr.* 1990, *112*, 115747 x); determination of petroselinic acid (13.0%) in seed oil by GC (*Rev. Fr. Corps Gras* 1991, *38*, 109; *Chem. Abstr.* 1991, *115*, 134503 t).

PAULOWNIA (Scrophulariaceae)

P. tomentosa Steud. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 540).

Stereoselective synthesis of paulownin (*Tetrahedron Lett.* 1992, *33*, 6025; *Tetrahedron* 1993, *49*, 8415); methyl 5-hydroxy-dinaphtho(1,2-2',3')furan-7,12-dione-6-carboxylate isolated from stem and its crystal structure determined (*Arch. Pharmacal Res.* 1992, *15*, 52; *Chem. Abstr.* 1992, *117*, 208891 h); two iridoid glucosides - tomentoside and 7-hydroxytomentoside - isolated along with paulownioside and catalpol (*Phytochemistry* 1993, *34*, 1636).

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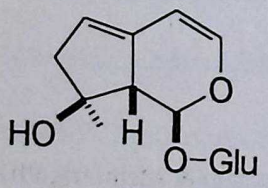
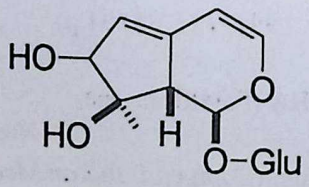


Tomentoside



7-Hydroxytomentoside

PEDALIUM (Pedaliaceae)

P. murex L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 483).

5,7-Dimethoxy-2',4',5'-trihydroxyflavone and triacontanyl dotriacontanoate along with luteolin, rubusic acid, nonacosane, tritriacontane, triacontanoic acid, tritriacontanoic acid and sitosterol-β-D-glucoside isolated from fruits (*Phytochemistry* 1992, *31*, 2917).

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PEDILANTHUS (Euphorbiaceae)

P. tithymaloides (L.) Poit. (*Compend. Indian Med. Plants.*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 541).

Octacosanol, cycloartenone and β-sitosterol isolated (*J. Indian Chem. Soc.* 1992, *69*, 411).

PEGOLETTIA (Asteraceae)

P. senegalensis Cass. (*Compend. Indian Med. Plants.*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 484).

1α,8β-Dihydroxy-5β-H,10α-methyleudesma-3,11-dien-cis-6,12-olide, 8-oxogermacra-1(10)E,4E,11(13)trien-6β,12-olide, its 7(11)dehydro isomer, 8β-(4'-hydroxytigloyloxy)- and 8β-(5'-hydroxytigloyloxy)-germacra-trans,trans-1(10),4,11-trien-cis-6,12-olides, 8β-(4',5'-dihydroxytigloyloxy)-germacra-trans,trans-1(10),4,11-trien-cis-6,12-olide and 8β-hydroxy-germacra-trans,trans-1(10),4,11-trien-cis-6,12-olide-(2'-hydroxy-2.5H-furan-4'-oate) isolated from aerial parts (*Phytochemistry* 1989, *28*, 1949).

PELARGONIUM (Geraniaceae)

P. capitatum (L.) Ait.

α-Pinene, α-phellandrene, p-cymene, γ-terpinene, β-caryophyllene, guaia-6,9-diene, germacrene D, δ-cadinene, citronellol, terpinen-4-ol, 10-epi-γ-eudesmol and citronellyl formate identified in essential oil (*J. Essent. Oil Res.* 1993, *5*, 493; *Chem. Abstr.* 1994, *121*, 153276 m). Distribution: Introduced into hill stations of southern India.

P. peltatum Ait.

Oligomeric gallic acid, myricetin-3-rutinoside and quercetin-3-rhamnoside identified in leaves (*Gartenbauwissenschaft* 1990, *55*, 113; *Chem. Abstr.* 1991, *114*, 118455 c). Distribution: Introduced into Indian gardens.

P. zonale Ait. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 484).

Identification of oligomeric gallic acid, myricetin-3-rutinoside and quercetin-3-rhamnoside in leaves (*Gartenbauwissenschaft* 1990, *55*, 113; *Chem. Abstr.* 1991, *114*, 118455 c).

PELLAEA (Pteridaceae)

P. calomelanos (L.) Link; see *Pityrogramma calomelanos* (L.) Link

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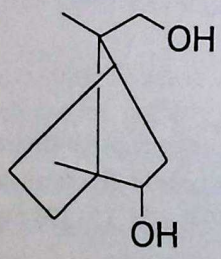
PENTANEMA (Asteraceae)

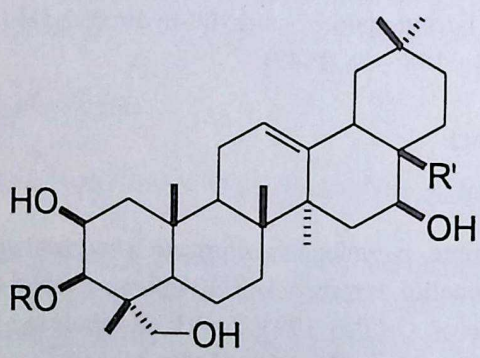
P. indicum (L.) Ling syn. *Vicoa auriculata* Cass., *V. indica* (L.) DC., *Inula indica* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 542).

Piperine isolated from whole plant (*Indian Drugs* 1989, *26,* 708); epilupeol and its acetate isolated (*Int. J. Crude Drug Res.* 1990, *28,* 121; a new monoterpenediol - vicodiol - isolated and its structure elucidated by X-ray studies (*J. Nat. Prod.* 1990, *53,* 354); isolation and characterisation of a new triterpenoid glucoside - vicoside B - and a nortriterpenoid - vicosigenin (*J. Nat. Prod.* 1992, *55,* 1149); vicolides A, B, C and D isolated; crystal structures of vicolide A acetate and vicolide D established (*J. Crystallogr. Spectrosc. Res.* 1993, *23,* 339; *Chem. Abstr.* 1993, *119,* 49674 n); a sesquiterpene lactone (I) isolated as its acetate from aerial parts and characterised as 2α,9β-diacetoxy-6α-(2-methylbutyryloxy)-7β,8α-cis-germacrenolide (*Phytochemistry* 1994, *37,* 585).

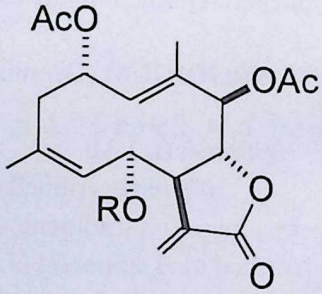
NEW COMPOUNDS



Vicodiol



Vicosigenin
R = H, R' = OCHO
Vicoside B
R = Glu, R' = CHO



I

BIOLOGICAL ACTIVITY

Epilupeol and its acetate exhibited pronounced antiviral activity against Ranikhet disease virus in chick embryo (*Int. J. Crude Drug Res.* 1990, *28,* 121); vicolides A, B, C and D (10.0 mg/kg, s.c.) exhibited anti-inflammarory activity in cotton pellet granuloma test in rats, vicolides C and D being more potent. Vicolide D showed antipyretic activity at 0.25 g/kg, p.o., which was attributed to presence of epoxyangeloyl group in the molecule (*Indian J. Exp. Biol.* 1992, *30,* 38); vicolide B and vicolide D exhibited antifertility activity while vicolide A and vicolide C were devoid of this activity (*J. Crystallogr. Spectrosc. Res.* 1993, *23,* 339; *Chem. Abstr.* 1993, *119,* 49674n).

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PENTATROPIS (Asclepiadaceae)

P. capensis (L.f.) Bullock syn. *P. microphylla* (Roxb.) Wt. & Arn. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 188).

Drug has antifungal, antiseptic and keratolytic properties probably due to appreciable amount of salicylic acid.

Octacosanol, α-amyrin, friedelin, β-sitosterol and salicylic acid isolated (*Indian Drugs* 1990, *27,* 399).

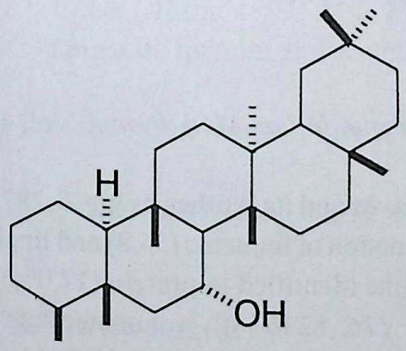
P. cynanchoides R.Br.; see *P. nivalis* (Gmel.) Field & Wood

P. microphylla (Roxb.) Wt. & Arn.; see *P. capensis* (L.f.) Bullock

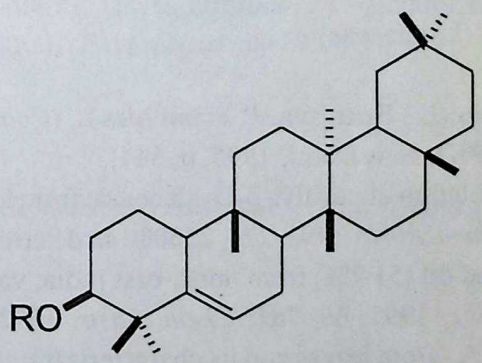
P. nivalis (Gmel.) Field & Wood syn. *P. cynanchoides* R.Br., *P. spiralis* sensu Hook.f. [non (Forsk.) Decne.] (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 188).

A new triterpene isolated and characterised as cycloart-22-en-3α,25-diol; cycloeucalenol and 24-methylenecycloartanol also isolated (*J. Nat. Prod.* 1991, *54,* 889); isolation and structure determination of cis-phytyl-1-palmitate; squalene, ψ-taraxasterol and taraxasterol also isolated (*Phytochemistry* 1991, *30,* 1331); pentatronol and pentatropeline isolated and their structures elucidated as D:A-friedo-oleanan-7α-ol and D:B-friedo-olean-5-en-3β-yl palmitate respectively (*Fitoterapia* 1992, *63,* 156).

NEW COMPOUNDS



Pentatronol



Pentatropeline
R = Palmitoyl

P. spiralis (Forsk.) Decne.; see *P. nivalis* (Gmel.) Field & Wood

PEPEROMIA (Peperomiaceae)

P. exigua (Blume) Miq.; see *P. pellucida* (L.) H.B. & K.

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P. pellucida (L.) H.B. & K. syn. *P. exigua* (Blume) Miq.

Isolation and characterisation of a new flavonoid - pellucidatin - together with apigenin, acacetin and isovitexin (*Sci. Phys. Sci.* 1993, *5*, 213; *Chem. Abstr.* 1994, *121*, 78279 j); another flavonol glycoside - pellucidatin-8-neohesperidoside - isolated (*Sci. Phys. Sci.* 1994, *6*, 141; *Chem. Abstr.* 1994, *121*, 276688 e).

Distribution: Introduced into India from South America, now naturalized in West Bengal, Arunachal Pradesh, Tamil Nadu, Sikkim and Bhutan.

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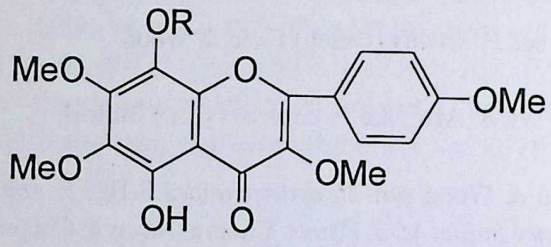

Pellucidatin
R = H
Pellucidatin-8-neohesperidoside
R = Neohesperidose

PERGULARIA (Asclepiadaceae)

P. minor Andr.; see *Telosma cordata* (Burm.f.) Merr.

PERILLA (Lamiaceae)

P. frutescens (L.) Britt. syn. *P. ocimoides* L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 544).

Isolation of perillyl-β-D-glucoside from leaves and its synthesis (Jpn. 3,287,597 (1990) Mar. 31; *Chem. Abstr.* 1992, *116*, 236080 s); determination of linolenic (56.8) and linoleic (17.6%) acids in seed oil (51.7%) from north-east India; valine identified in protein (17.0%) (*J. Am. Oil Chemists Soc.* 1991, *68*, 781; *Chem. Abstr.* 1992, *116*, 82467 h); a monoterpene glucoside - perilloside A - from leaves and its characterisation (*Phytochemistry* 1991, *31*, 3265); isolation of three more monoterpene glucosides - perillosides B,C and D - from leaves and their structure determination (*Phytochemistry* 1993, *34*, 1545); seeds contained oleic, linolenic and linoleic acids as well as sitosterol (*Tokyo Gakugei Daigaku Kiyo, Dai-4-bumon* 1993, *45*, 27; *Chem. Abstr.* 1994, *120*, 240094 y); 1,2-methylenedioxy-4-methoxy-5-allyl-3-phenyl-β-D-glucoside, a fungicide, isolated from leaves (Jpn. 586,087 (1993) Apr. 06; *Chem. Abstr.* 1993, *119*, 113674 s).

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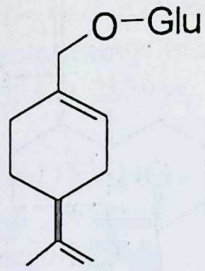
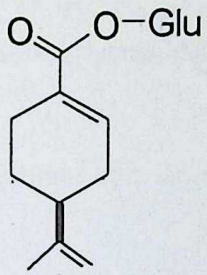
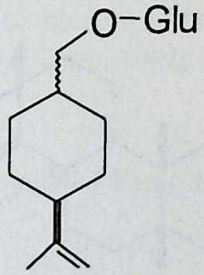


Perilloside A



Perilloside B



Perilloside C
~~ = α
Perilloside D
~~ = β

P. frutescens (L.) Britt. var. *crispa* (Benth.) Decne. ex Bailey syn. *P. ocimoides* L. var. *crispa* Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 544).

Four new anthocyanins - caffeylmalonylcyanin, malonyl-cis-shisonin, caffeylcyanin and cis-shisonin - isolated from leaves and characterised as cyanidin-3-(6-O-trans-caffeyl-glucosido)-5,(6-O-malonyl) glucoside, 3-(6-O-cis-p-coumarylglucosido)-5-(6-O-malonyl)-glucoside, 3-(6-O-trans-caffeylglucosido)-5-glucoside and 3-(6-O-cis-p-coumaryl-glucosido)-5-glucoside (*Agric. Biol. Chem.* 1990, *54,* 1745); myristicin (53.4%) along with 3-octen-3-ol, linalool, nerolidol, spathulenol and phytol identified in leaf oil by GC-MS (*Han'guk Sikpum Kwahakhoechi* 1991, *23,* 129; *Chem. Abstr.* 1992, *116,* 27908 c); leaves afforded 7-O-glucuronosyl(1→2)-glucuronides of apigenin, luteolin and scutellarein (*Phytochemistry* 1993, *33,* 917).

P. ocimoides L.; see *P. frutescens* (L.) Britt.

P. ocimoides L. var. *crispa* Benth.; see *P. frutescens* (L.) Britt. var. *crispa* (Benth.) Decne. ex Bailey

PERIPLOCA (Asclepiadaceae)

P. calophylla (Wt.) Falc. ssp. *forrestii* (Schlecht) Browciz syn. *P. forrestii* Schlecht

A new cardenolide - 8β-hydroxyperiplogenin - isolated from rhizomes and characterised; periplogenin, periplocin, pregn-5-en-3β,17α,20α-triol-20-O-β-D-canaroside, daucosterol and ursolic acid also isolated (*Yunnan Zhiwu Yanjiu* 1989, *11,* 465; *Chem. Abstr.* 1990, *113,* 94733 t); rhizomes of Chinese plant afforded two more cardenolides - periforgenin A and periforoside I - whose structures established by X-ray analysis (*Huaxue Xuebao* 1990, *48,* 714; *Chem. Abstr.* 1991, *114,* 3447 j).

Distribution: Himalayas, from Kashmir to Nepal and Meghalaya, ascending to 1800 m.

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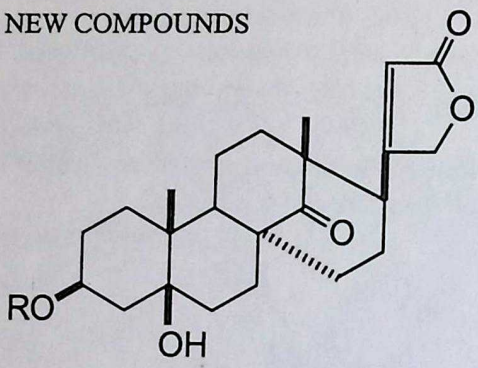
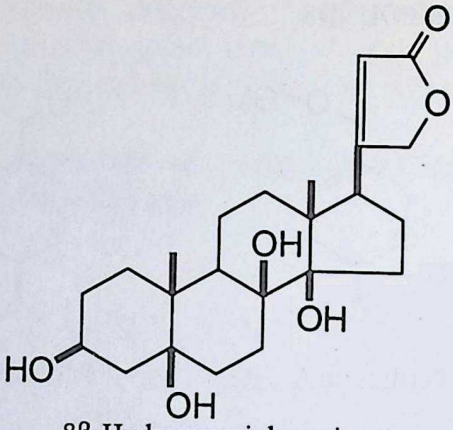
NEW COMPOUNDS



Periforgenin A
R = H
Periforoside I
R = 2,6-Dideoxy-4-glucosyl-3-OMe-β-D-ribohexapyranose



8β-Hydroxyperiplogenin

P. forrestii Schlecht; see *P. calophylla* (Wt.) Falc. ssp. *forrestii* (Schlecht) Browciz

PERISTROPHE (Acanthaceae)

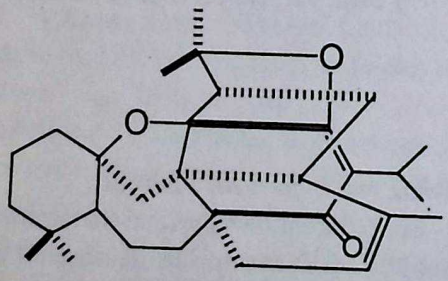
P. japonica (Thunb.) Bremk.; see *Dicliptera roxburghiana* Nees

PEROVSKIA (Lamiaceae)

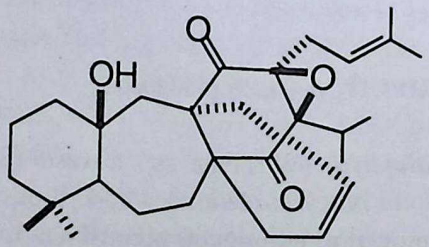
P. abrotanoides Karel. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 487).

A new triterpene - perovskone - isolated from whole plant and its structure established by X-ray studies (*J. Org. Chem.* 1992, *57,* 4339); another triterpene - peradione - isolated from Pakistani plant and characterised (*Tetrahedron Lett.* 1993, *34,* 5337).

NEW COMPOUNDS



Perovskone



Peradione

PERSEA (Lauraceae)

P. americana Mill. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 546).

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Three antifungal compounds isolated from immature fruits and identified as 1,2,4-trihydroxyheptadec-16-yne, 1,2,4-trihydroxyheptadec-16-ene and 1-acetoxy-2,4-dihydroxy-heptadec-16-yne (*Phytochemistry* 1992, *31,* 93); leaves contained scopoletin, apigenin, luteolin, its 7-glucoside, astragalin and quercetin-3-diglucoside (*Acta Pharm. Turc.* 1992, *34,* 61; *Chem. Abstr.* 1993, *118,* 3839 w).

P. bombycina (King ex Hook.f.) Kostermans syn. *Machilus bombycina* King & Hook.f., *M. sericea* (Nees) Blume

Assam - Som.

3',4'-Dimethylquercetin, 3,5-dihydroxy-7,2',4'-trimethoxyflavone and 2',4'-dimethylmorin along with quercetin, morin and myricetin isolated from leaves (*J. Heterocycl. Chem.* 1993, *3,* 139; *Chem. Abstr.* 1994, *121,* 5166 k); decanol and tetradecanal major constituents of leaf essential oil (*Indian Perfum.* 1994, *38,* 33; *Chem. Abstr.* 1994, *121,* 163657 a).
Distribution: Himalayas, Kumaon eastwards and Assam ascending upto 1200 m.

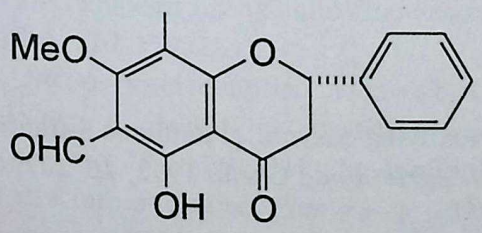
PERSICARIA (Polygonaceae)

P. stagnina (Buch.-Ham. ex Meissn.) Hara; see *Polygonum stagninum* Buch.-Ham. ex Meissn.

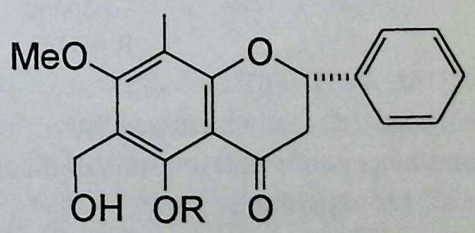
PETIVERIA (Phytolaccaceae)

P. alliacea L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 523).

Trans-N-methyl-4-methoxyproline from stems; dibenzyltrisulphide isolated from roots and β-sitosterol, pinitol, allantoin, lignoceryl alcohol, lignoceric acid, lignoceryl lignocerate and α-friedelinol from whole plant (*Phytochemistry* 1990, *29,* 3653); leaves afforded three new pinocembrin derivatives - leridal, leridol and 5-O-methylleridol - which were characterised; 3-O-rhamnosides of dihydrokaempferol, dihydroquercetin and myricetin also isolated (*Phytochemistry* 1992, *31,* 2481).
NEW COMPOUNDS



Leridal



Leridol
R = H
5-O-Methylleridol
R = Me

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PETREA (Verbenaceae)

P. volubilis Jacq.

Oleic (42.1), stearic (20.9), palmitic (10.7), myristic (8.9) lauric (5.9), behenic (4.2), linoleic (3.8) and arachidic (3.5%) acids determined in seed oil (*Fett. Wiss. Technol.* 1990, *92*, 131; *Chem. Abstr.* 1990, *112*, 232551 q).

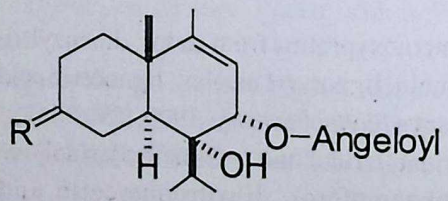
Distribution: Native of tropical America, introduced into Indian gardens.

PETROSELINUM (Apiaceae)

P. crispum (Mill.) A.W. Hill syn. *P. sativum* Hoffm., *Apium petroselinum* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 546).

Seeds afforded trans-2,3-methylenedioxy-4-methoxycinnamaldehyde together with isoimperatorin, umbelliferone and p-hydroxycinnamic acid (*Indian J. Chem.* 1990, *29*B, 187); myristicin (21.8), p-1,3,8-menthatriene (10.49), 1-methyl-4-isopropenylbenzene (4.52) and myrcene (3.02%) determined in leaf oil (0.06%) by GC-MS whereas seed oil contained myristicin (47.54), α-pinene (22.28) and β-pinene (16.02%) (*Han'guk Nonghwa Hakhoe Chi* 1990, *33*, 62; *Chem. Abstr.* 1990, *113*, 189976 p); two angelic acid esters - crispanone and crispane - isolated and their structures established (*Phytochemistry* 1992, *31*, 3109; *Chem. Mikrobiol., Technol. Lebensm.* 1992, *13*, 178; *Chem. Abstr.* 1992, *117*, 110355 m); myristicin isolated from leaf oil (*J. Agric. Food. Chem.* 1992, *40*, 107; *Chem. Abstr.* 1992, *116*, 34014 m).

NEW COMPOUNDS



Crispanone
R = O
Crispane
R = H,H

BIOLOGICAL ACTIVITY

Myristicin greatly increased activity of detoxifying enzyme, glutathione S-transferase, in liver and mucosa of small intestine of mouse (*J. Agric. Food Chem.* 1992, *40*, 107; *Chem. Abstr.* 1992, *116*, 34014 m).

P. sativum Hoffm.; see *P. crispum* (Mill.) A.W. Hill

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PEUCEDANUM (Apiaceae)

P. graveolens (L.) Benth. & Hook.f.; see *Anethum graveolens* L.

P. sowa Kurz; see *Anethum graveolens* L.

PHAECASIUM (Asteraceae)

P. lampsanoides Cass.; see *Crepis pulchra* L.

PHASEOLUS (Papilionaceae)

P. angularis (Willd.) W.F. Wight; see *Vigna angularis* (Willd.) Ohwi & Ohashi

P. aureus Roxb.; see *Vigna radiata* (L.) Wilczek var. *radiata*

P. lunatus L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 189).

A crystalline protein consisting of phaseolin subunits isolated from large beans (*J. Agric. Food Chem.* 1994, *42,* 2679; *Chem. Abstr.* 1994, *121,* 299484 z).

P. mungo L.; see *Vigna mungo* (L.) Hepper and *V. radiata* (L.) Wilczek var. *radiata*

P. radiatus L.; see *Vigna radiata* (L.) Wilczek var. *radiata*

P. radiatus L. var. *aureus* (Roxb.) Prain; see *Vigna radiata* (L.) Wilczek var. *radiata*

P. vulgaris L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 547).

Water-soluble extract of beans showed strong antioxidant activity (*J. Am. Oil Chemists Soc.* 1993, *70,* 909; *Chem. Abstr.* 1994, *120,* 53262 q); ethanolic extract of seed coat of red and black beans exhibited strong antioxidant activity (*J. Agric. Food Chem.* 1994, *42,* 248; *Chem. Abstr.* 1994, *120,* 129511 t).

Myo-inositol identified in leaves by GC-MS (*Acta Physiol. Plant.* 1989, *11,* 97; *Chem. Abstr.* 1990, *113,* 168942 j); identificantion of N^6-methylagmatine in seeds and seedlings (*Phytochemistry* 1990, *29,* 1313); seeds afforded a new triterpene triglucoside - phaseoluside A - whose structure elucidated (*Planta Med.* 1991, *57,* 94); O-hydroxybenzoylaspartate from leaves (*Phytochemistry* 1991, *30,* 4041); myristic, palmitic, hexadecanoic, stearic, oleic and linoleic acids, kaempferol-3-rutinoside and quercetin-3-rutinoside identified in green beans (*Qatar Univ. Sci. J.* 1992, *12,* 69; *Chem. Abstr.* 1993, *119,* 221699 n); cyanidin-3-O-β-D-glucoside and

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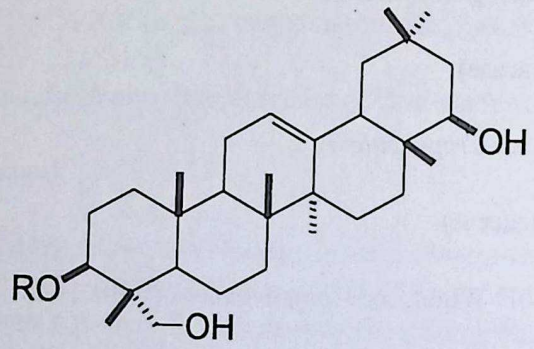
pelargonidin-3-O-β-D-glucoside isolated from seeds of red bean whereas delphinidin-3-O-β-D-glucoside from seeds of black bean (*J. Agric. Food Chem.* 1994, *42,* 248; *Chem. Abstr.* 1994, *120,* 129511 t).

NEW COMPOUNDS



Phaseoluside A
R = Glu[(3→1)Glu](4→1)Glu

BIOLOGICAL ACTIVITY

Cyanidin-3-O-β-D-glucoside showed strong antioxidant activity in linoleic acid system at pH 7.0. Delphinidin-3-O-β-D-glucoside and pelargonidin-3-O-β-D-glucoside were inactive at pH 7.0 but under acidic conditions (pH 3.0 and 5.0), both showed strong antioxidant activity (*J. Agric. Food Chem.* 1994, *42,* 248; *Chem. Abstr.* 1994, *120,* 129511 t).

PHLOMIS (Lamiaceae)

P. rotata Benth. syn. *Lamiophlomis rotata* (Benth.) Kudo

4,6,7-Trimethoxy-8-hydroxyxanthone, β-sitosterol and palmitic acid isolated from roots (*Zhongcaoyao* 1990, *21,* 530; *Chem. Abstr.* 1991, *114,* 203516 t); two new iridoid glycosides - dehydropentstemoside and 7-epiphlomiol - isolated from aerial parts and characterised; shanzhiside methyl ester and barlerin also isolated (*Phytochemistry* 1991, *30,* 4156); roots afforded epimeric iridoids - lamiophlomiol A and its 1-epimer, lamiophlomiol B - whose structures were determined (*Yaoxue Xuebao* 1991, *26,* 37; *Chem. Abstr.* 1991, *114,* 253904 p); isolation and structure elucidation of another iridoid - lamiophlomiol C - from roots (*Yaoxue Xuebao* 1992, *27,* 204; *Chem. Abstr.* 1992, *117,* 108088 h); 8-O-acetylshanzhiside methyl ester, shanzhiside methyl ester and sesamoside present in Tibetan plant (*Zhongcaoyao* 1992, *23,* 509; *Chem. Abstr.* 1993, *118,* 131850 e).

Distribution: Sikkim Himalayas, alt. 3700-4800 m.

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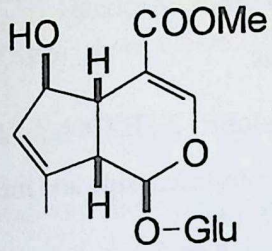
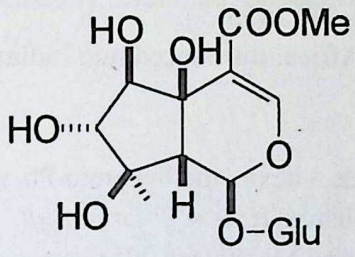
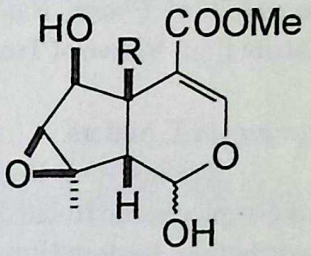
NEW COMPOUNDS



Dehydropenstemoside



7-Epiphlomiol



Lamiophlomiol A
R = H, ~~ = β
Lamiophlomiol B
R = H, ~~ = α
Lamiophlomiol C
R = OH, ~~ = α

P. spectabilis Falc. ex Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 550).

28-Norolean-16,21-dien-3α,19α,23,29-tetrol and 28-norolean-16,21-dien-3α,19α,29-triol-23-al isolated (*Phytochemistry* 1992, *31,* 2797).

PHOENIX (Arecaceae)

P. canariensis Chabaud (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 491).

Leaves contained tricin-7-O-β-D-glucoside, isorhamnetin-3-O-β-D-glucoside, isoquercitrin, isorhamnetin-3-O-β-D-rutinoside, rutin and methyl 25(S)-proto-Pb (*Chem. Pharm. Bull.* 1991, *39,* 2053).

P. dactylifera L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 550).

Tricin-7-O-β-D-glucoside, tricin-7-O-α-L-rhamnosyl(1→2)-β-D-glucoside, isorhamnetin-3-O-β-D-glucoside, methyl proto-prosapogenin A of dioscin, methyl proto-reclinatoside and methyl proto-Pb isolated from leaves (*Chem. Pharm. Bull.* 1991, *39,* 2053).

P. humilis Royle var. *loureirii* (Kunth) Becc.; see *P. loureirii* Kunth

P. loureirii Kunth syn. *P. humilis* Royle var. *loureirii* (Kunth) Becc.

Vitexin, glucoluteolin, orientin, isoorientin, methyl proto-Pb, methyl proto-rupicolaside and methyl proto-loureiroside isolated from leaves (*Chem. Pharm. Bull.* 1991, *39,* 1455). Distribution: Khasi Hills, Assam and Manipur.

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P. reclinata Jacq.

Methyl proto-Pb, methyl proto-rupicolaside and methyl proto-reclinatoside isolated from leaves (*Chem. Pharm. Bull.* 1991, *39,* 1455).

Distribution: Native of Tropical Africa, introduced into Indian gardens.

P. rupicola T.Anders.

Tricin-7-O-β-D-glucoside, vitexin, methyl proto-Pb, methyl proto-teccaoside and methyl proto-rupicolaside isolated from leaves (*Chem. Pharm. Bull.* 1991, *39,* 1455).

Distribution: Eastern Himalayas and Meghalaya, also grown in gardens.

PHRYMA (Phrymataceae)

P. leptostachya L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 551).

A new insecticidal sesquilignan - haedoxan A - isolated from roots and its structure established and confirmed by synthesis (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1988, 30th, 1; *Chem. Abstr.* 1990, *112,* 195178 a; *Agric. Biol. Chem.* 1989, *53,* 631); haedoxan C acetate, haedoxan D, haedoxan F acetate, haedoxan G acetate and haedoxan H acetate isolated; 2S assignment in absolute structures of phrymarolin I and haedoxan D revised to 2R (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1988, 30th, 1; *Chem. Abstr.* 1990, *112,* 195178 a); synthesis of naturally-occurring insecticides haedoxans A, D and artificial congener, haedoxan E (*Agric. Biol. Chem.* 1989, *53,* 1565).

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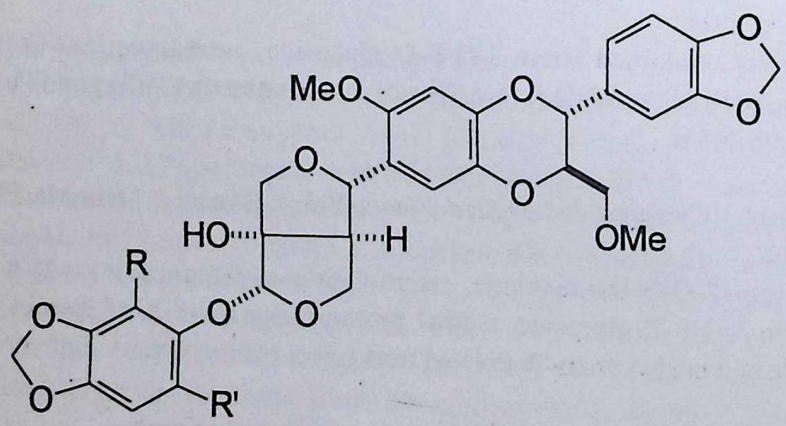

Haedoxan A
R,R' = OMe
Haedoxan D
R = H, R' = OMe
Haedoxan E
R,R' = H

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BIOLOGICAL ACTIVITY

Haedoxan A showed remarkably high insecticidal activity against housefly (LD50 1.6 ng) (*Agric. Biol. Chem.* 1989, *53*, 631).

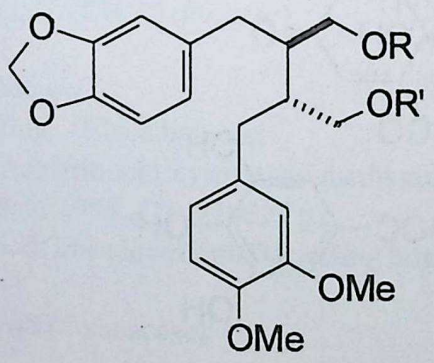
PHYLLANTHUS (Euphorbiaceae)

P. amarus Schum. & Thonn. syn. *P. niruri* sensu Hook.f., p.p. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 552).

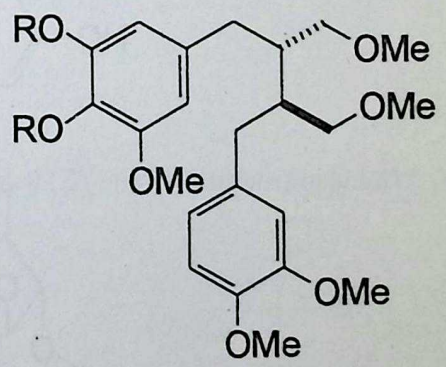
Plant extract showed *in vitro* antihepatitis B virus surface antigen-like activity (*Indian J. Med. Res.* 1990, *92,* 133); plant extract and silymarin exhibited hepatoprotective effect in rats by preventing CCl_4-induced reduction of ascorbic acid excretion in urine (*Indian J. Pharmacol.* 1994, *26,* 301).

Four new lignans - 2,3-desmethoxy seco-isolintetralin, 2,3-desmethoxy seco-isolintetralin diacetate, linnanthin and demethylenedioxyniranthin - isolated and their structures determined; structures of 5'-desmethoxyniranthin and 2-(3,4-dimethoxybenzyl),4-(3,4-methylenedioxybenzyl)butyrolactone (I) confirmed by synthesis (*Tetrahedron* 1991, *47,* 8931); an ellagitannin - phyllanthusiin D - isolated and its structure established (*Phytochemistry* 1992, *31,* 711); isolation and structure elucidation of a new cyclic tannin - amarulone (*Nat. Prod. Lett.* 1993, *3,* 45; *Chem. Abstr.* 1994, *121,* 53889 v); one more tannin - amariin - isolated and its structure established; geraniin, corilagin, 1,6-digalloyl-β-D-glucoside, rutin and quercetin-3-O-glucoside also isolated (*Phytochemistry* 1993, *33,* 487).

NEW COMPOUNDS



2,3-Desmethoxy seco-isolintetralin
R,R' = H
2,3-Desmethoxy seco-isolintetralin diacetate
R,R' = Ac
5'-Desmethoxyniranthin
R = Me, R' = H



Linnanthin
R = Me
Demethylenedioxyniranthin
R = H

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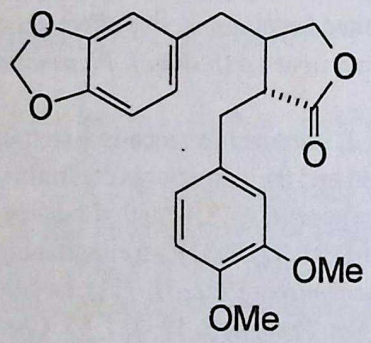
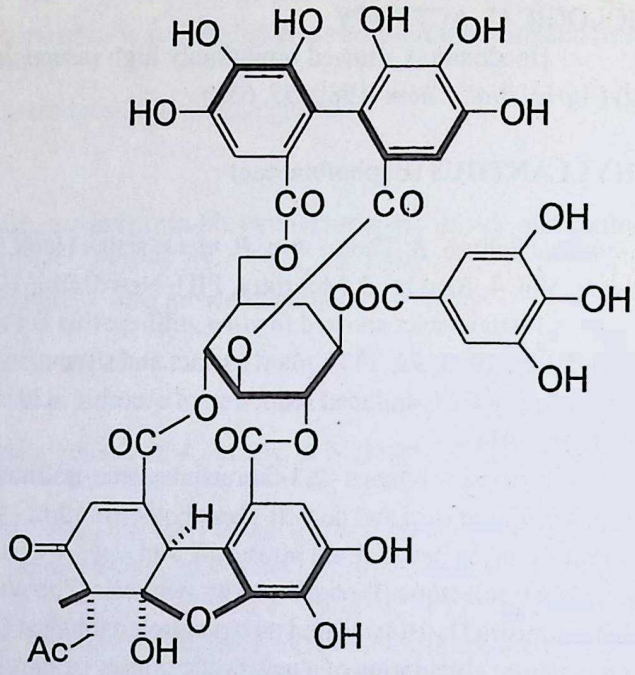
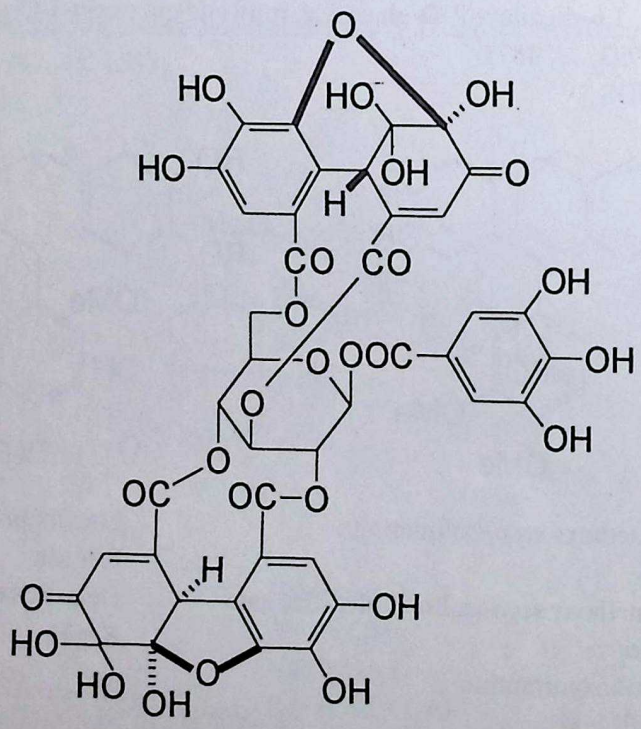


I



Phyllanthusiin D



Amariin

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P. emblica L.; see *Emblica officinalis* Gaertn.

P. fraternus Webster syn. *P. niruri* sensu Hook.f., p.p. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 553).

An acyclic triterpene isolated and characterised as (2Z,6Z,10Z,14E,18E,22E)-3,7,11,15,19,23-hexamethyltetracosahexen-1-ol (*Phytochemistry* 1989, *28,* 1980); isolation of three new alkaloids - 4-methoxydihydronorsecurinine, 4-methoxytetrahydrosecurinine and 4-hydroxysecurinine - along with securinine, dihydrosecurinine, tetrahydrosecurinine, securinol A, securinol B, allosecurinine and norsecurinine (*Indian J. Chem.* 1990, *29*B, 801); isolation of trans-phytol (*Planta Med.* 1991, *57,* 98); quercetin-3-O-β-D-glucosyl(1→4)-α-L-rhamnoside and 3,5,7,4'-tetrahydroxyflavone isolated (*J. Indian Chem. Soc.* 1991, *68,* 479).

P. indicus (Dalz.) Muell.-Arg.; see *Margaritaria indica* (Dalz.) Airy Shaw

P. niruri L.; see *P. amarus* Schum. & Thonn. and *P. fraternus* Webster

P. urinaria L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 494).

Lupeol, α-amyrin and 32-methyl-1-tritriacontanol isolated (*J. Indian Chem. Soc.* 1991, *68,* 479); ellagic acid, gallic acid, trimethyldehydrochebulic acid, n-octadecane, kaempferol, quercetin, rutin, methylbrevifolin carboxylate, β-sitosterol and daucosterol present (*Yaoxue Xuebao* 1993, *28,* 829; *Chem. Abstr.* 1994, *120,* 265753 a).

PHYLLOSTACHYS (Poaceae)

P. nigra Munro

Eng. - Black bamboo.

Aspartic acid, cystine and methionine identified (*Zhongguo Yaoxue Zazhi* 1993, *28,* 18; *Chem. Abstr.* 1993, *118,* 219597 p).

Distribution: Introduced into Darjeeling hills.

PHYSALIS (Solanaceae)

P. angulata L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 555).

Isolation of withangulatin A from whole plant (*Heterocycles* 1990, *31,* 1371); three new withanolides - physagulins A, B and D - obtained from leaves and stems and their structures determined by X-ray studies (*Chem. Pharm. Bull.* 1992, *40,* 2088); another withanolide - physagulin C - isolated from fresh leaves and stems and characterised (*Chem. Pharm. Bull.* 1991, *39,* 1591); three more withanolides - physagulins E, F and G - from fresh berries and their

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characterisation (*Chem. Pharm. Bull.* 1992, *40,* 2448); physalin D and physalin F isolated (*Anticancer Res.* 1992, *12,* 837; *Chem. Abstr.* 1992, *117,* 204655 m).

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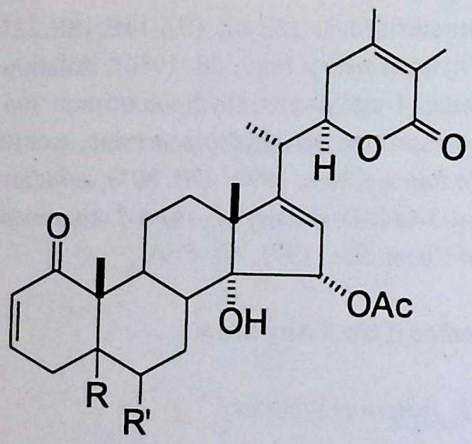
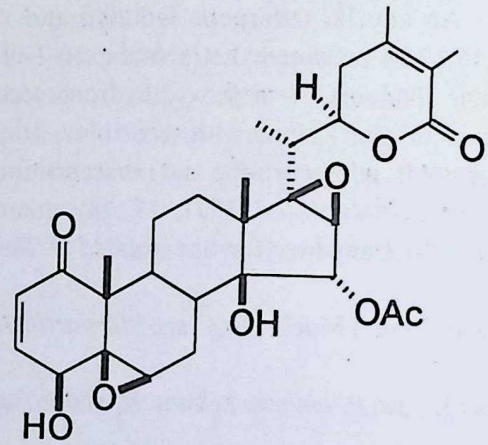
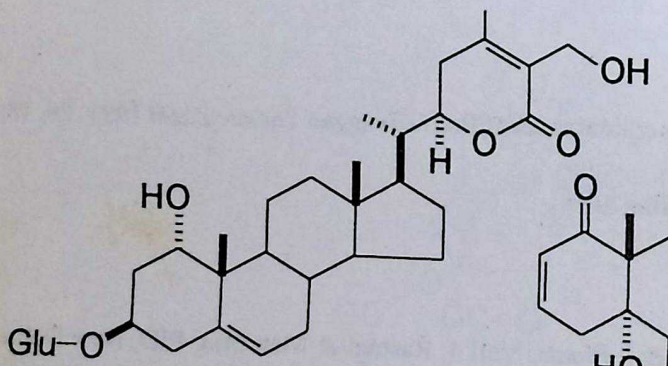


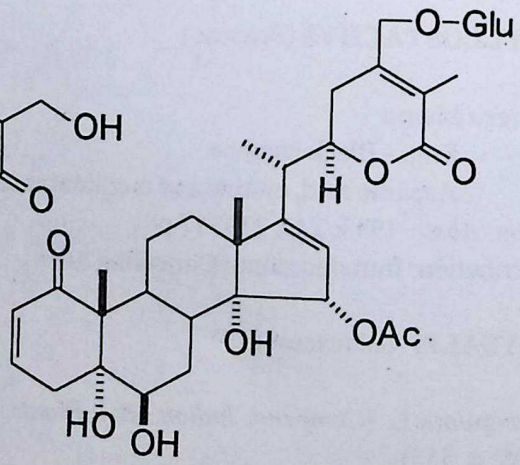
Physagulin A
RR' = -O-
Physagulin B
R = α-Cl, R' = β-OH



Physagulin C



Physagulin D



Physagulin E

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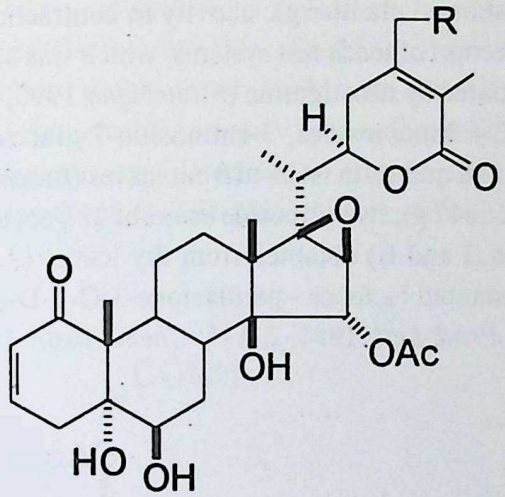

Physagulin F
R = H
Physagulin G
R = O-Glu

BIOLOGICAL ACTIVITY

Withangulatin A exhibited topoisomerase II inhibiting activity (*Heterocycles* 1990, *31*, 1371); physalin F was cytotoxic *in vitro* to five human cancer cell lines and three animal cancer cell lines; antihepatoma activity was found to be strongest followed by anti-HeLa activity. It also showed antitumor activity *in vivo* against P388 lymphocytic leukaemia in mice. Physalin D was inactive both *in vitro* and *in vivo* (*Anticancer Res.* 1992, *12*, 837; *Chem. Abstr.* 1992, *117*, 204655 m).

P. edulis Sims; see *P. peruviana* L.

P. minima L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 556).

Structures of 5-methoxy-6,7-methylenedioxyflavone and 5,6,7-trimethoxyflavone determined by X-ray analysis (*Acta Crystallogr., Cryst. Struct. Commun.* 1993, *49*C, 105; *Chem. Abstr.* 1993, *118*, 191387 u).

P. minima L. var. *indica* Clarke (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 557).

3,7,4'-Tri-O-methylquercetin and physalin B isolated from fruits (*J. Indian Chem. Soc.* 1990, *67*, 597).

P. peruviana L. syn. *P. edulis* Sims.(*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 557).

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Extract of fruit showed cholinergic activity in contraction of isolated jejunum of rats and isolated abdominal rectum of toads test systems, which was selectively blocked by atropine and gallamine and potentiated by neostigmine (*Fitoterapia* 1990, *61*, 333).

3-Rutinosides, 3-robinobiosides, 3-rutinosido-7-glucosides and 3-robinobiosido-7-glucosides of kaempferol and quercetin isolated from leaves (*Biochem. Syst. Ecol.* 1992, *20*, 268; *Chem. Abstr.* 1992, *117*, 66647 g); two glycoside esters of 22ξ-acetoxy-1α,3β-dihydroxyergosta-5,24(E)-dien-26-oic acids (I and II) obtained from dry leaves (*J. Nat. Prod.* 1993, *56*, 1365); leaves also afforded ergostanoid lactones - perulactone-3-O-β-D-glucoside and isoperulactone-3-O-β-D-glucoside (*Nat. Prod. Lett.* 1993, *2*, 115; *Chem. Abstr.* 1994, *121*, 31076 a).

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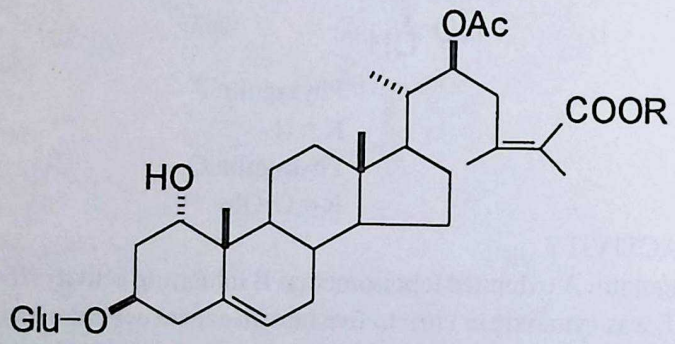

I

R = Glu(2→1)Glu(6-Ac)(4→1)Glu

II

R = Glu(2→1)Glu(6-Ac)(4→1)Glu(6-Ac)

BIOLOGICAL ACTIVITY

Glycoside esters (I and II) at a concentration of 35.0 mg/kg in artificial diet reduced growth of *Heliocoverpa zea* larvae by 50% (*J. Nat. Prod.* 1993, *56*, 1365); perulactone-3-O-β-D-glucoside at a dietary concentration of 0.15 g/kg reduced growth of same larvae by 50% (*Nat. Prod. Lett.* 1993, *2*, 115; *Chem. Abstr.* 1994, *121*, 31076 a).

PHYSOSTIGMA (Papilionaceae)

P. venenosum Balf. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 558).

Synthesis of physovenine and physostigmine (*J. Chem. Soc.* Perkin 1 1991, 3047).

PHYTOLACCA (Phytolaccaceae)

P. acinosa Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 558).

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Aqueous extract of leaves on hydrolysis yielded a new triterpene - acinospesigenin - together with phytolaccagenin (*Planta Med.* 1990, *56,* 284); isolation of 2-ethyl-1-hexanol, 2-methoxy-4-propenylphenol, dibutyl phthalate, ethyl palmitate, zonarol, linolein-2-monoglyceride and tetradecyl palmitate from rhizomes (*Zhongguo Yaoxue Zazhi* 1990, *25,* 585; *Chem. Abstr.* 1991, *115,* 46025 h); a new saponin - esculentoside S - from leaves and its characterisation as phytolaccagenin-3-O-β-D-xylosido-28-O-β-D-glucoside (*Nat. Prod. Lett.* 1993, *2,* 243; *Chem. Abstr.* 1994, *121,* 31080 x).

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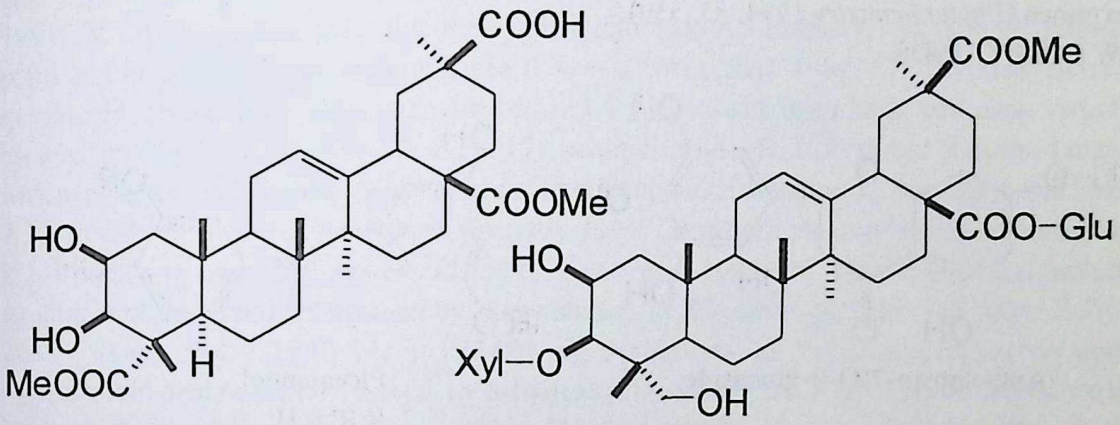

Acinospesigenin Esculentoside S

BIOLOGICAL ACTIVITY

Administration of polysaccharide I (5.0 - 50.0 mg/kg, i.p.) to mice augmented natural killer cell activity and lymphocyte proliferation induced by con A or lipopolysaccharide after seven days. Splenocytes from mice treated with same dosage of polysaccharide I on incubation with con A for 24-40 hr induced production of IL-2 and natural killer cytotoxic factor (*Zhongguo Yaoli Xuebao* 1993, *14,* 243; *Chem. Abstr.* 1993, *119,* 62646 z); polysaccharide I (10.0 and 20.0 mg/kg/day x 10 days, i.p.) inhibited sarcoma-180 growth by 51.7%. It had significant effect on spleen growth of S180-bearing mice; it increased T-lymphocyte proliferation and IL-2 production by splenocytes of S180-bearing mice induced by con A *in vitro,* indicating that polysaccharide I augments cellular immunity and haematopoiesis (*Zhongguo Yaolixue Yu Dulixue Zazhi* 1993, *7,* 52; *Chem. Abstr.* 1993, *118,* 225076 j); polysaccharide II (0.1 mg/ml) significantly augmented splenocyte proliferation in dose-dependent fashion and enchanced con A and LPS-induced lymphocyte proliferation, showing that immunological function and haematopoiesis are enhanced (*Yaoxue Xuebao* 1993, *28,* 490; *Chem. Abstr.* 1993, *119,* 241058 f).

PICEA (Pinaceae)

P. abies (L.) Karst. syn. *Abies excelsa* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 559).

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α-Pinene (29.4) and β-pinene (17.2%) determined in bark essential oil of plant from Norway (*Khim. Drev.* 1990, 104; *Chem. Abstr.* 1990, *113,* 227974 w); four stilbenes - piceatannol, isorhapontin, (E)4,3',5'-trihydroxy-3-methoxystilbene (I) and (E)3'-β-D-glucosyloxy-3,4,5'-trihydroxystilbene (II) - from bark (*Ann. Chem.* 1992, 399); astringin, resveratrol, isorhapontigenin, isorhapontin and piceatannol isolated and their relative content in bark determined by RP-HPLC (*Phytochemistry* 1992, *31,* 3288); myricetin-3,4'-O-β-diglucoside, kaempferol-3,4'-O-β-diglucoside and kaempferol-3-O-β-glucoside isolated from needles (*Phytochemistry* 1992, *32,* 179); a new dihydroflavanol - ampelopsin-7-O-β-D-glucoside - together with taxifolin-7-O-glucoside and aromadendrin isolated from needles of Norway spruce; structure of new compound determined (*Phytochemistry* 1994, *35,* 550).

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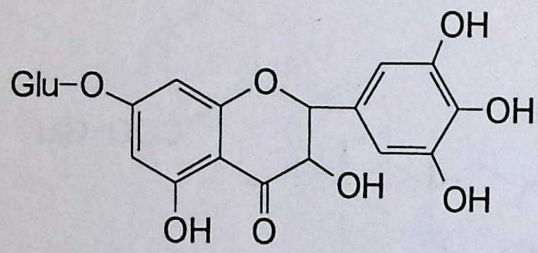
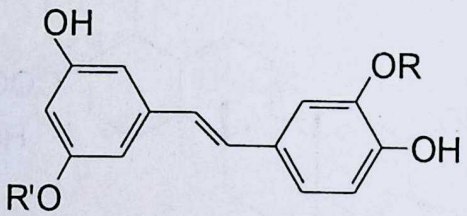


Ampelopsin-7-O-β-glucoside



Piceatannol
R,R' = H
Isorhapontin
R = Me, R' = Glu
I
R = Me, R' = H
II
R = H, R' = Glu

BIOLOGICAL ACTIVITY

Isorhapontin and piceatannol at 0.1 mM showed activity against L1210 leukaemia cells in mice (*Phytochemistry* 1992, *31,* 3288); piceatannol, isorhapontin and stilbenes (I) and (II) at 0.1 mM showed *in vitro* antitumor activity in mice leukaemia L1210 cells; stilbene (I) was found to be the most potent compound (*Ann. Chem.* 1992, 399).

PICRASMA (Simaroubaceae)

P. andamanica Kurz ex Benn.; see *P. javanica* Blume

P. javanica Blume syn. *P. nepalensis* Benn., *P. andamanica* Kurz ex Benn., *P. javanica* Blume var. *nepalensis* (Benn.) Badhwar (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 559).

Germacrane derivatives (I and II) isolated from leaves (Jpn. 1,228,979 (1989) Sep. 12; *Chem. Abstr.* 1990, *112,* 164944 t); three new quassinoids - javanicins A, C and D - isolated from

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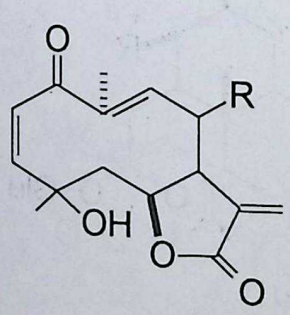
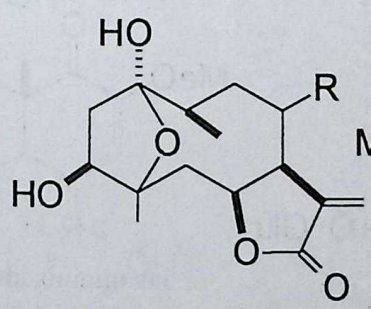
bark of Indonesian plant and their structures established (*Chem. Pharm. Bull.* 1989, *37,* 2991); bark afforded another quassinoid - javanicin B - along with picrasinosides B and F (*Phytochemistry* 1990, *29,* 2617); isolation of javanicins E, F, G and M from bark and their structure elucidation; quassin also isolated (*Chem. Pharm. Bull.* 1990, *38,* 2746); javanicins H, I and J from leaves and their structures determined (*Phytochemistry* 1991, *30,* 933); javanicins K, L, N, O, P, Q, R, S and T from bark, leaves and wood; nagakilactones B and F also isolated from Indonesian plant (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1990, 32nd, 175; *Chem. Abstr.* 1991, *114,* 160712 j; *J. Nat. Prod.* 1991, *54,* 837; *Chem. Pharm. Bull.* 1991, *39,* 939); isolation of javanicins U, V, W, X and Y from Indonesian whole plant and determination of their structures (*Chem. Pharm. Bull.* 1991, *39,* 2021); a quassinoid glucoside - javanicinoside A - isolated from bark of Indonesian plant and its crystal structure determined (*Chem. Pharm. Bull.* 1989, *37,* 993); two more new quassinoid glycosides - javanicinosides B and C - obtained from bark and their structures established (*Phytochemistry* 1990, *29,* 2617); javanicinosides D, E, F, G and H isolated together with neoquassin and picrasin A; structures of new compounds determined; hispidol A and lanosta-7,24-dien-3-one also isolated (*Phytochemistry* 1991, *30,* 4099); stems afforded javanicinosides I, J, K and L whose structures elucidated (*J. Nat. Prod.* 1992, *55,* 482); crystal and molecular structures of crenatine determined by X-ray studies (*J. Crystallogr. Spectrosc. Res.* 1990, *20,* 261; *Chem. Abstr.* 1990, *113,* 172401 z); structures of 5-hydroxycrenatine and 5-hydroxydehydrocrenatine revised to 8-hydroxycrenatine and 8-hydroxydehydrocrenatine respectively by X-ray studies (*Aust. J. Chem.* 1990, *43,* 433); isolation of two new quassinoids - picrajavanins A and B - from bark of Indonesian plant along with picrasidine G; absolute stereochemistry of new compounds determined (*Chem. Pharm. Bull.* 1993, *41,* 2101); stems afforded a new β-carboline alkaloid - javacarboline - whose structure elucidated (*Heterocycles* 1994, *38,* 1413).

NEW COMPOUNDS



I
R = $OCOCHMe_2$



II
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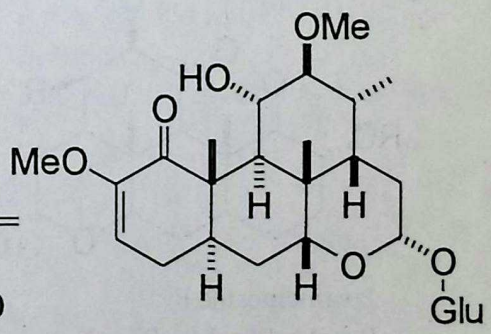

Javanicinoside A

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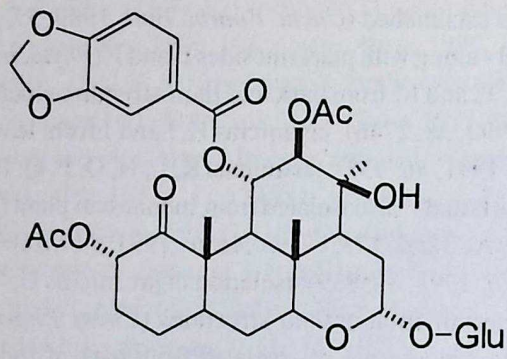
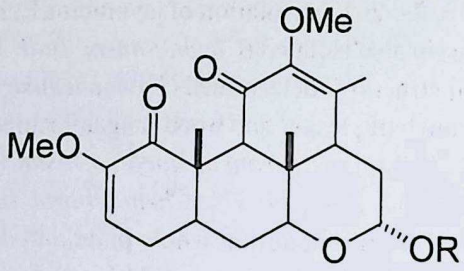
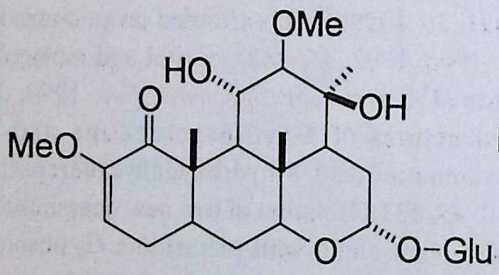


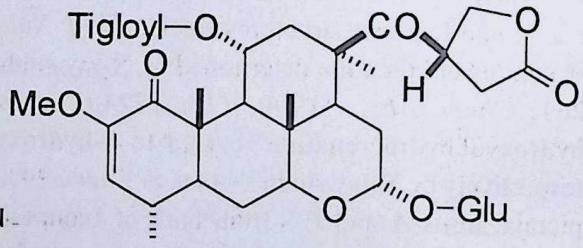
Javanicinoside B



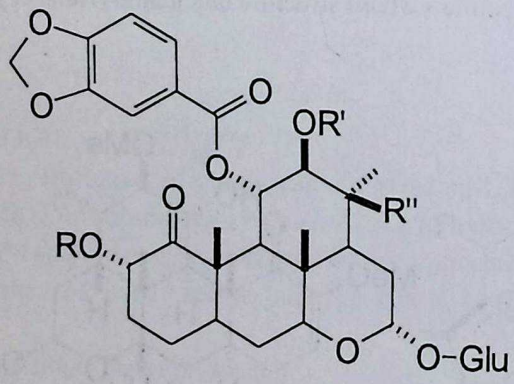
Javanicinoside C
R = Glu
Javanicin B
R = H



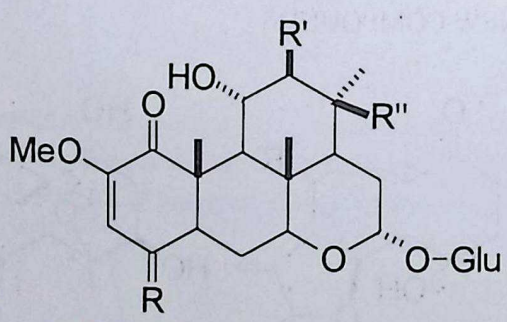
Javanicinoside D



Javanicinoside E



Javanicinoside F
R = Ac, R' = Me, R'' = H
Javanicinoside G
R,R' = Me, R'' = H
Javanicinoside H
R = H, R' = Ac, R'' = OH



Javanicinoside I
R = O, R' = OMe, R'' = H
Javanicinoside J
R = α-Me,β-H, R' = OAc, R'' = OH
Javanicinoside K
R = H,H, R' = OAc, R'' = OH
Javanicinoside L
R = α-Me,β-H, R',R'' = OH

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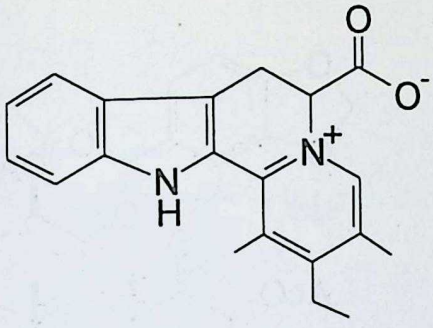
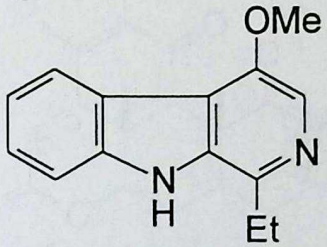
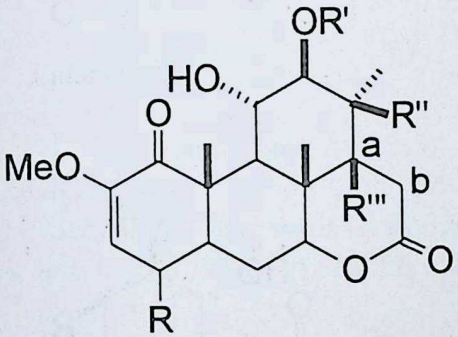


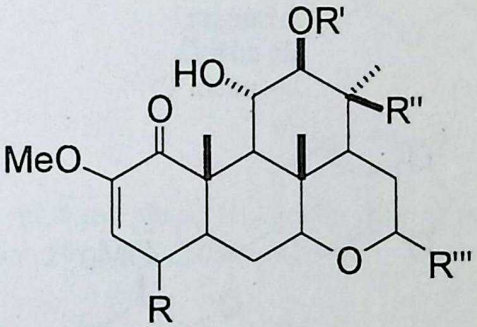
Javacarboline



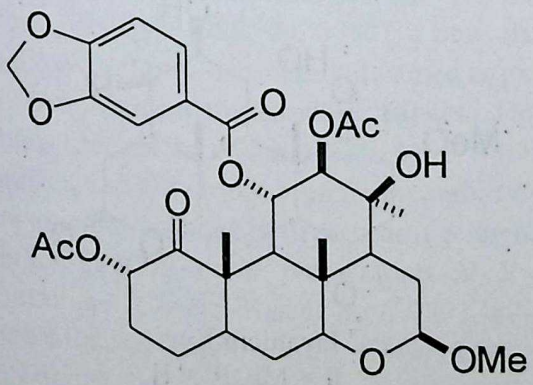
Crenatine



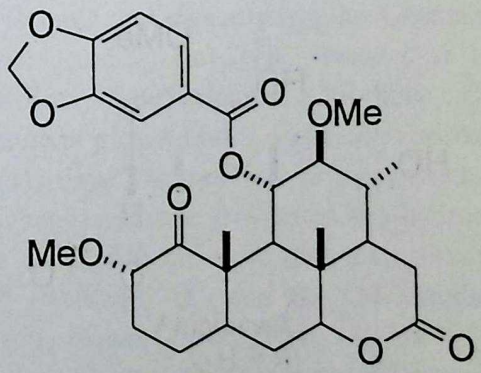
Javanicin A
R,R",R''' = H, R' = Me
Javanicin H
R,R''' = H, R' = Me, R" = OH
Javanicin O
R,R",R''' = H, R' = Me, ab = Δ
Javanicin P
R,R" = H, R' = Me, R''' = OH



Javanicin C
R = H, R' = Me, R" = OH, R''' = β-OMe
Javanicin E
R,R" = H, R' = Me, R''' = α-OMe
Javanicin L
R,R" = H, R' = Me, R''' = α-OH
Javanicin M
R = α-Me, R'= Me, R" = H, R'''= β-OH
Javanicin Q
R,R' = H, R" = OH, R''' = α-OMe



Javanicin D



Javanicin G

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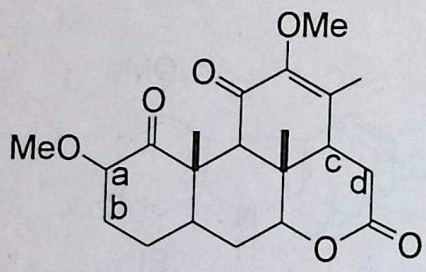
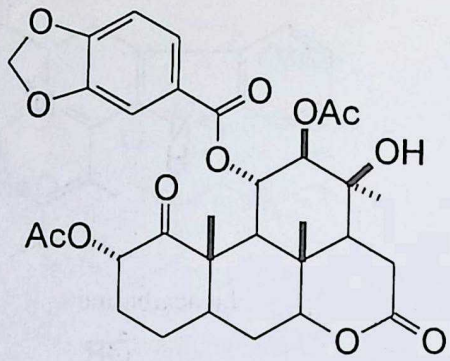
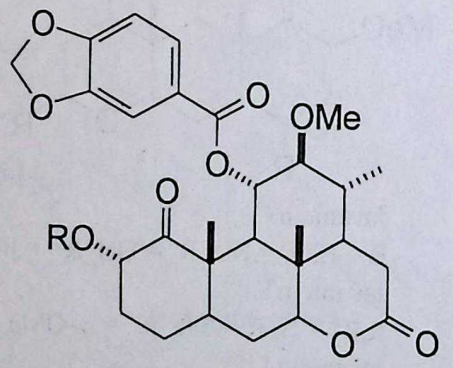


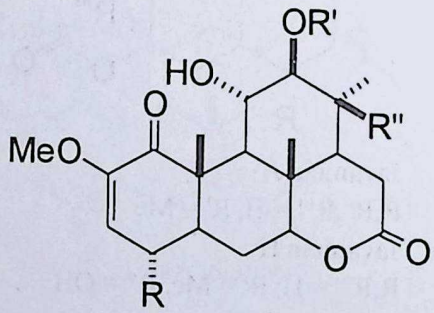
Javanicin F
ab = △
Javanicin I
ab, cd = △
Javanicin T



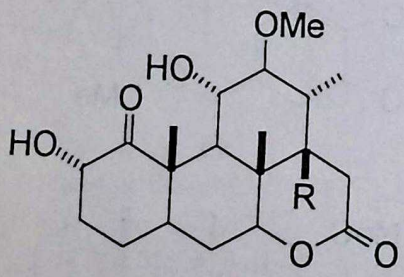
Javanicin J



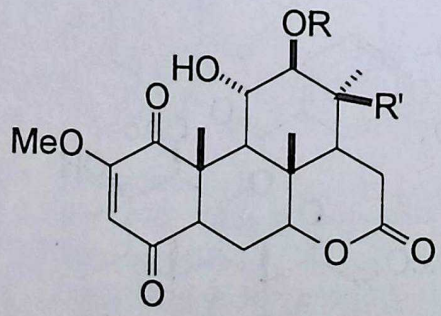
Javanicin K
R = Benzoyl
Javanicin N
R = Ac
Javanicin S
R = H



Javanicin R
R = OH, R' = Me, R'' = H
Javanicin U
R = Me, R' = Ac, R'' = OH



Javanicin V
R = H
Javanicin W
R = OH



Javanicin X
R = Me, R' = H
Javanicin Y
R = H, R' = OH

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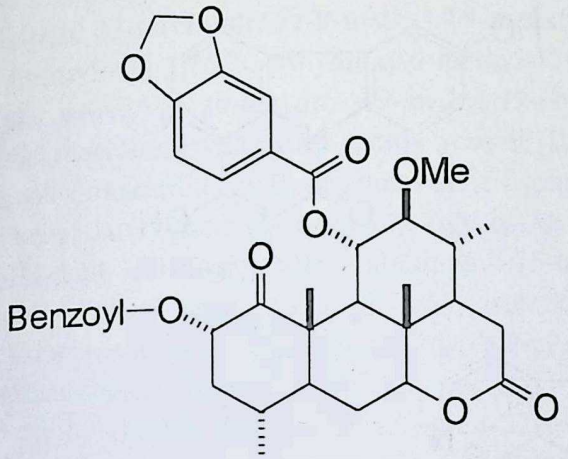
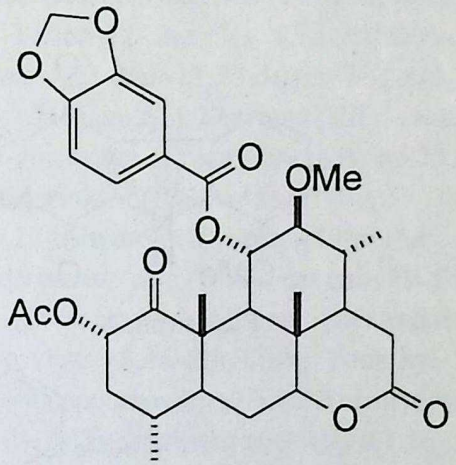


Picrajavanin A



Picrajavanin B

BIOLOGICAL ACTIVITY

Germacrane derivative (I) at 0.5 μg/ml inhibited mouse leukaemia cells *in vitro* by 97.9% (Jpn. 1,228,979 (1989) Sep. 12; *Chem. Abstr.* 1990, *112,* 164944 t).

P. javanica Blume var. *nepalensis* (Benn.) Badhwar; see *P. javanica* Blume

P. nepalensis Benn.; see *P. javanica* Blume

P. quassioides (D.Don) Benn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 560).

Chloroform-soluble fraction of methanolic extract of wood prevented in dose-dependent manner, secretion of gastric juice in rats having aspirin-induced gastric ulcers (*Nat. Med.* 1994, *48,* 116; *Chem. Abstr.* 1994, *121,* 221589 t).

Enantioselective synthesis of (+)picrasin B (*Tetrahedron Lett.* 1989, *30,* 5985, 5989); isolation of a new β-carboline alkaloid - picrasidine V - from root wood and its structure elucidation (*Phytochemistry* 1990, *29,* 3060); a new alkaloid isolated and characterised as 4-hydroxy-5-methoxycanthin-6-one; alkaloid named as picrasidine Q and earlier (*Chem. Pharm. Bull.* 1985, *33,* 4901) assigned this structure, suggested to be 4-hydroxy-3-methylcanthin-5,6-dione on basis of new spectral data (*Ann. Chem.* 1992, 987); structure of picrasidine Q was again revised and confirmed as 4-hydroxy-5-methoxycanthin-6-one on basis of X-ray studies; further, structure of new alkaloid, mentioned in preceding reference, was suggested to be reassigned as 5-hydroxy-4-methoxycanthin-6-one; picrasidines W, X and Y isolated from wood and their structures determined (*Chem. Pharm. Bull.* 1993, *41,* 1807); ^{13}C-NMR, 1D- and 2D-NMR studies of picrasidine G (*Magn. Reson. Chem.* 1993, *31,* 1091; *Chem. Abstr.* 1994, *120,* 164624 d); nigakinone and methylnigakinone identified as components responsible for gastric juice secretion (*Nat. Med.* 1994, *48,* 116; *Chem. Abstr.* 1994, *121,* 221589 t).

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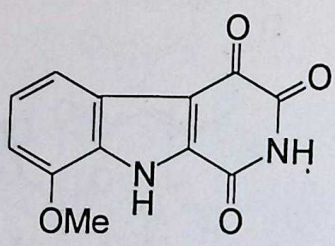
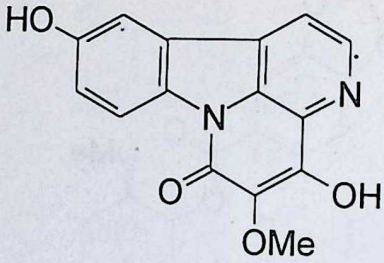
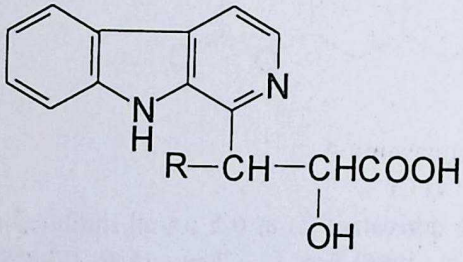
NEW COMPOUNDS



Picrasidine V



Picrasidine W



Picrasidine X
R = H
Picrasidine Y
R = OH

PICRORHIZA (Scrophulariaceae)

P. kurrooa Royle ex Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 564).

Alcoholic extract of roots exhibited anti-inflammatory activity in adjuvant-induced and formaldehyde arthritis in rats and mice (*Phytother. Res.* 1993, *7,* 402; *Chem. Abstr.* 1994, *120,* 260821 m).

A new iridoid glycoside - 6-feruloylcatalpol - isolated from roots together with veronicoside, minecoside, picein and androsin; structure of new compound determined (*Planta Med.* 1989, *55,* 467); aqueous sodium carbonate extract yielded, after acetylation, seven substances as acetates which were characterised as β-D-6-cinnamoylglucopyranose, 1-[2-(3-hydroxy-4-methoxyphenyl)ethyl]-β-laminaribiose, (1R,5R,6S,7R,8S,11S)6,7,8-trihydroxy-2,10-dioxatricyclo[6,2,1,0]undecan, catalpol, picroside I, picroside II and 20(R)3β,16α,20,25-tetrahydroxy-2β-(β-D-glucopyranosyloxy)-10α-cucurbit-5-en-22-one (I); in addition, three cucurbitacins having short side-chain, probably artifacts which originated during working up of extract, also isolated and characterised as 16α-hydroxy-22,23,24,25,26,27-hexanor-2β-(β-D-glucopyranosyloxy)-10α-cucurbit-5-en-3,11,20-trione (II), 20(R)16α,20-dihydroxy-24,25,26,27-tetranor-2β-(β-D-glucopyranosyloxy)-10α-cucurbit-5-en-3,11,22-trione (III) and 20(R) 3β,16α,20-trihydroxy-24,25,26,27-tetranor-2β-(β-D-glucopyranosyloxy)-10α-cucurbit-5-en-

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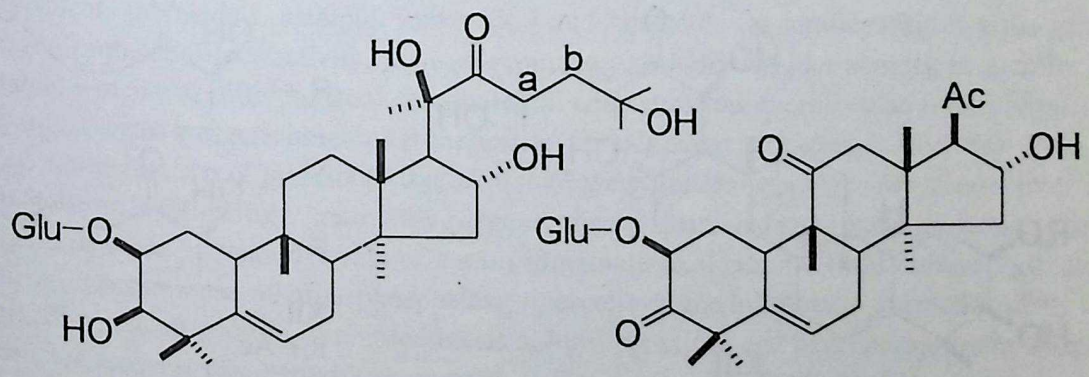
11,22-dione (IV) (*Ann. Chem.* 1989, 1113); three new cucurbitacin glycosides - 2β-(glucosyloxy)-3,16,20,25-tetrahydroxy-9-methyl-19-norlanosta-5,23-dien-22-one (V), 25-(acetoxy)-2β-(glucosyloxy)-3,16,20-trihydroxy-9-methyl-19-norlanosta-5,23-dien-11,22-dione (VI) and 2β-(glucosyloxy)-16,20-dihydroxy-9-methyl-19-norlanosta-5,24-dien-3,11,22-trione (VII) - isolated from roots along with cucurbitacin glycoside (I) and 2-O-glucosides of cucurbitacin B and 23,24-didehydrocucurbitacin B; structures of new compounds determined (*Planta Med.* 1989, *55,* 559); another cucurbitacin glycoside - 2β-(glucosyloxy)-16,20,22-trihydroxy-9-methyl-19-norlanosta-5,24-dien-3,11-dione (VIII) - along with 25-deacetyl derivative of (VI) and arvenin III from roots (*Phytochemistry* 1990, *29,* 1633); isolation of six more cucurbitacins from roots and their characterisation as 25-(acetoxy)-2β-(β-D-glucopyranosyloxy)-3,16-dihydroxy-9-methyl-19-norlanosta-5,23-dien-22-one (IX), 25-(acetoxy)-2β-(β-D-glucopyranosyloxy)-3,16,20-trihydroxy-9-methyl-19-norlanosta-5,23(Z)-dien-22-one (X), 2-(β-D-glucopyranosyloxy)-3,16,20-trihydroxy-9-methyl-19-norlanosta-5,24-dien-22-one (XI), 2β-(β-D-glucopyranosyloxy)-3,16-dihydroxy-4,4,9,14-tetramethyl-19-norpregn-5-en-20-one (XII), 2,3,16,20,25-pentahydroxy-9-methyl-19-norlanost-5-en-22-one (XIII) and 2β-(6-O-cinnamoyl-β-D-glucopyranosyloxy)-3,16,20,25-tetrahydroxy-9-methyl-19-norlanost-5-en-22-one (XIV); 25-acetyl derivative of (I) also isolated (*Phytochemistry* 1991, *30,* 305); six more new cucurbitacin glycosides - (2β,9β,10α,20ξ,24ξ)20,24-epoxy-2β-(β-D-glucopyranosyloxy)-16,25-dihydroxy-9-methyl-19-norlanost-5-en-3,11-dione (XV), (2β,3β,9β,10α,16α,20ξ, 24ξ)20,24-epoxy-2β-(β-D-glucopyranosyloxy)-3,16,25-trihydroxy-9-methyl-19-norlanost-5-en-11-one (XVI), (2β, 9β,10α,16α,20ξ,24ξ)20,24-epoxy-2β-(β-D-glucopyranosyloxy)-16, 25,26-trihydroxy-9-methyl-19-norlanost-5-en-3, 11-dione (XVII), (2β,9β,10α,16α,20ξ, 24ξ)20,24-epoxy-2β-(β-D-glucopyranosyloxy)-3,16,25,26-tetrahydroxy-9-methyl-19-norlanost-5-en-11-one (XVIII), (2β,9β,10α,16α,20β,24Z)2β-(β-D-glucopyranosyloxy)-16,20,26-trihydroxy-9-methyl-19-norlanost-5,24-dien-3,11-dione (XIX) and (2β,9β,10α,16α,20β,24Z)2β-(β-D-glucopyranosyloxy)-3,16,20,25-tetrahydroxy-9-methyl-19-norlanost-5,24-dien -11-one (XX) - isolated from roots (*Phytochemistry* 1993, *33,* 1139).

NEW COMPOUNDS



I

V

ab = Δ

II

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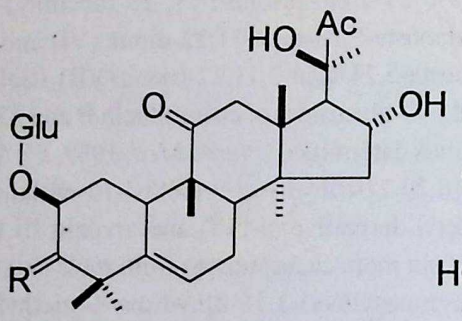
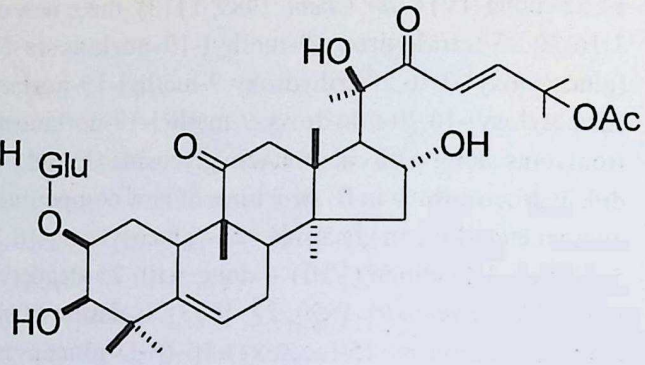


III
R = O
IV
R = β-OH,H



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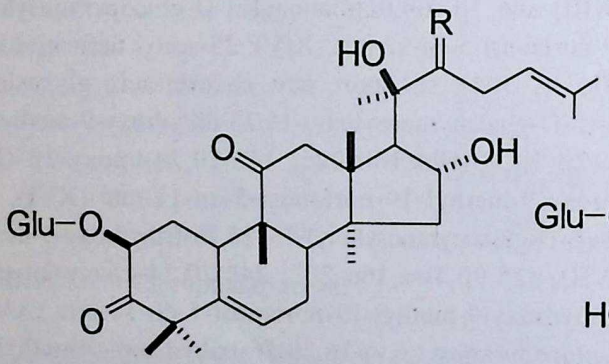
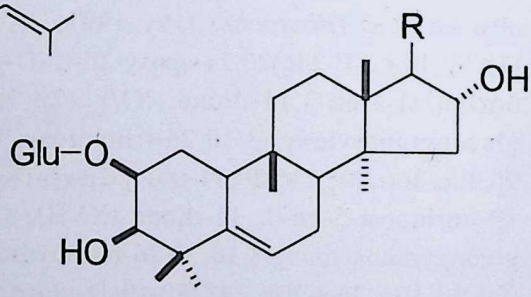
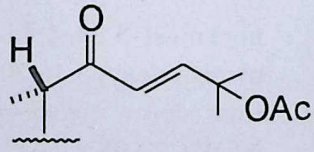


VII
R = O
VIII
R = OH,H



IX
R =



X
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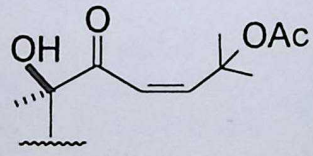

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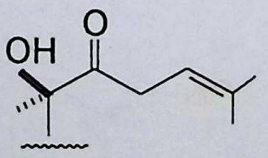
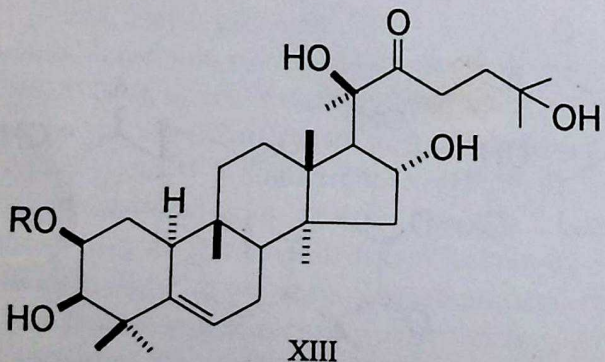


XII
R = Ac



XIII
R = H
XIV
R = Glu(6-cinnamoyl)

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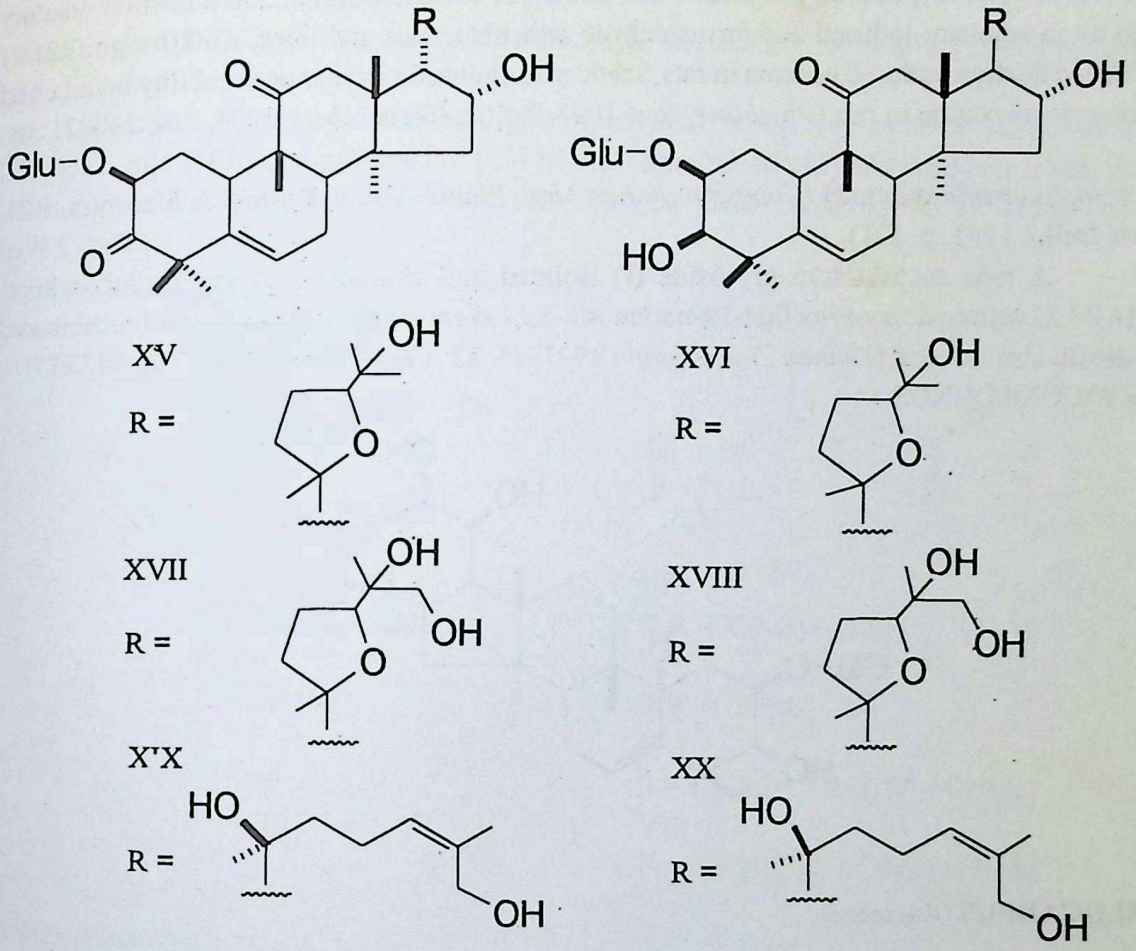

BIOLOGICAL ACTIVITY

Testing of picroliv (a standardised fraction of alcoholic extract of plant) and its major components picroside I, catalpol, kutkoside I and kutkoside for antihepatitis B virus surface antigen (anti-HBs)-like activity, showed promising anti-HBsAg-like activity in picroliv and catalpol which was different from classical viral neutralisation. Picroliv also inhibited purified hepatitis B virus antigens prepared from healthy HBsAg carriers (*Indian J. Med. Res.* 1990, *92,* 133); administration of picroliv (3.0 to 12.0 mg/kg/day for two weeks) to *Mastomys natalensis* simultaneously following *Plasmodium berghei* infection provided significant protection against hepatic damage; increased levels of serum glutamate oxaloacetate transaminase, glutamate pyruvate transaminase, alkaline phosphatase, liporotein-X and bilirubin in infected animals were markedly reduced; picroliv decreased levels of lipid peroxides and hydroperoxides in liver and facilitated recovery of superoxide dismutase (*Indian J. Med. Res.* 1990, *34,* 92); picroliv in doses of 6.0 and 12.0 mg/kg provided significant protection against most of the hepatic and serum biochemical alterations produced by CCl_4 in rats. Degree of protection afforded by picroliv when

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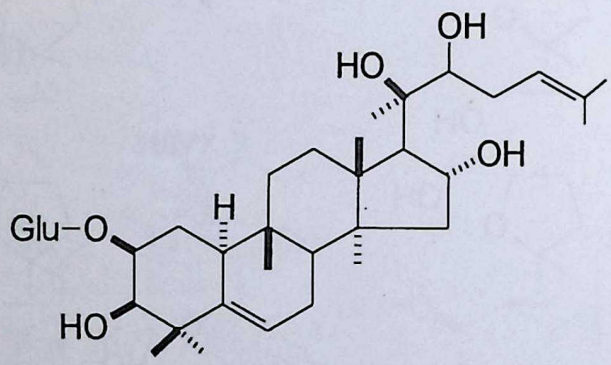
administered simultaneously with infection or as pretreatment was almost equal (*Indian J. Med. Res.* 1990, *92,* 195); kutkin, picroside I and kutkoside exhibited significant anti-inflammatory activity in adjuvant-induced and formaldehyde arthritis in rats and mice. Kutkin significantly inhibited dextran-induced oedema in rats, acetic acid-induced vascular permeability in mice and leukocyte migration in rats (*Phytother. Res.* 1993, *7,* 402; *Chem. Abstr.* 1994, *120,* 260821 m).

P. scrophulariiflora Pennel (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 501).

A new cucurbitacin glycoside (I) isolated and characterised as 2β-glucosyloxy-3,16,20,22-tetrahydroxy-9-methyl-19-norlanosta-5,24-dien; amphicoside, catalpol, aucubin and androsin also isolated (*Yunnan Zhiwu Yanjiu* 1993, *15,* 83; *Chem. Abstr.* 1993, *119,* 91273 f).

NEW COMPOUNDS



I

PILOCARPUS (Rutaceae)

P. racemosus Vahl

Determination of diethyl 2-hydroxyglutarate (0.09), xanthyletin (0.07), xanthotoxin (0.06), luvangetin (0.03) and bergapten (0.006%) in leaves (*Fitoterapia* 1993, *64,* 557).

Distribution: Native of tropical America, introduced into gardens of Calcutta.

PIMENTA (Myrtaceae)

P. dioica (L.) Merr.

Eng. - Allspice tree, Jamaica pepper tree, Pimento tree.

Eugenol (87.0%) as major component together with camphene, β-phellandrene and guaiene identified in oil by GC-MS (*Nahrung* 1989, *33,* 717; *Chem. Abstr.* 1990, *112,* 156914 t); samples of leaf volatile oil from Jamaican plant contained eugenol (66.38-79.24%) (*J. Essent. Oil. Res.* 1991, *3,* 195; *Chem. Abstr.* 1991, *115,* 155058 s).

Distribution: Native to West Indies and tropical America, introduced into Indian gardens.

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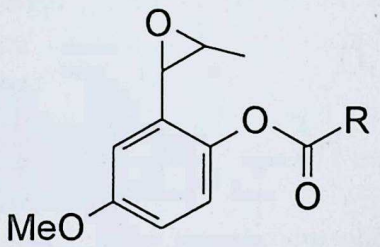
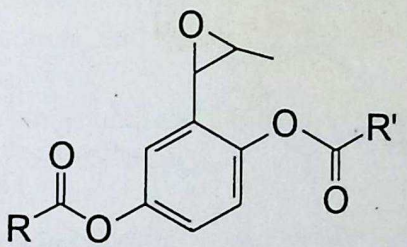
PIMPINELLA (Apiaceae)

P. diversifolia DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 566).

Determination of 4-substituted-2-[(E)3-methyloxiranyl]phenyl esters (I-VI) (78.0) and C10-, C12- and C15-hydrocarbons (20.0%) in root essential oil of flowering plant (*Proc. Int. Congr. Essent. Oils Fragrances Flavours,* 11th 1989, 83; *Chem. Abstr.* 1992, *117,* 188237 u).

NEW COMPOUNDS





I
R = C(Me)=CHMe
II
R = $CHMe_2$

III
R,R' = C(Me)=CHMe
IV
R,R' = $CHMe_2$
V
R = C(Me)=CHMe, R' = $CHMe_2$
VI
R = $CHMe_2$, R' = C(Me)=CHMe

PINUS (Pinaceae)

P. halepensis Mill.

Eng. - Aleppo pine.

(+)Catechin, procyanidin B3 and procyanidin B6 as major components together with (+)catechin, (–)epicatechin and (+)gallocatechin as peracetates and procyanidins B1, B3, B4, B6 and B7 as decaacetates, identified in unripe fruits (*Int. J. Pharmacog.* 1991, *29,* 221; *Chem. Abstr.* 1992, *116,* 170230 f).

Distribution: Native of Mediterranean region, introduced into India at Srinagar (J. & K. State).

P. massoniana Lamb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 567).

Determination of trans-caryophyllene (42.36), α-pinene (10.72), bornyl acetate (6.81), longifolene (6.18), α-copaene (5.55) and car-3-ene (3.46%) by GC-MS in essential oil from needles (*Linchan Huaxue Yu Gongye* 1990, *10,* 99; *Chem. Abstr.* 1991, *114,* 160664 v); isolation and structure determination of 15-hydroxy-7,13-abietadien-12-on-18-oic acid (I), 8(14)-

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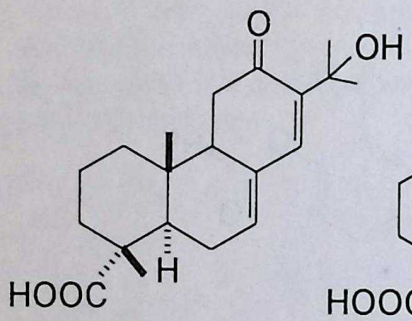
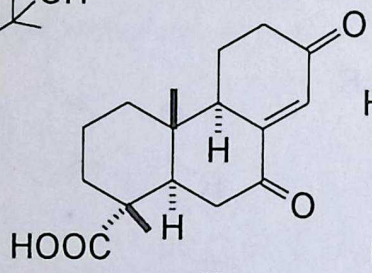
podocarpen-7,13-dion-18-oic acid (II), 2β-hydroxy-8,11,13-abietatrien-18-oic acid (III), 7,13,15-abietatrien-18-oic acid (IV) and 13-hydroxy-8,11,13-podocarpatrien-18-oic acid (V) from resin (*Tetrahedron* 1993, *49,* 7903); needles contained taxifolin-3'-O-β-D-glucoside (*Linchan Huaxue Yu Gongye* 1993, *13,* 143; *Chem. Abstr.* 1994, *120,* 240107 e); acidic fraction of resin contained pimaric, livopimaric, palustric, neoabietic, abietic, dehydroabietic, 7-oxodehydroabietic, and 7α-hydroxydehydroabietic acids (*Arzneim. Forsch.* 1994, *44,* 17; *Chem. Abstr.* 1994, *120,* 208198 z).

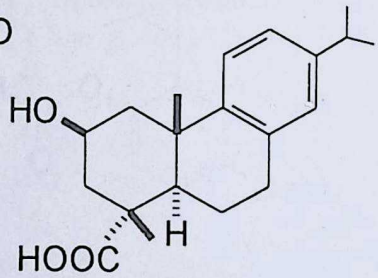
NEW COMPOUNDS



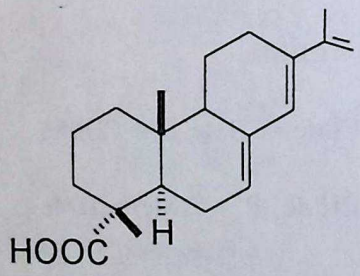
I



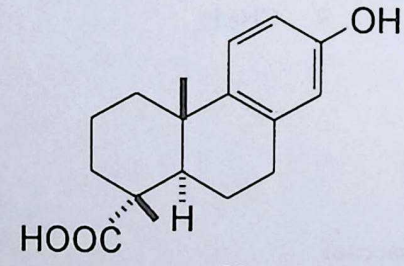
II



III



IV



V

BIOLOGICAL ACTIVITY

Pimaric, livopimaric, palustric and neoabietic acids showed inhibition of aggregation of platelets comparable with or higher than that of linolenic acid, with livopimaric acid showing the highest inhibition (*Arzeneim. Forsch.* 1994, *44,* 17; *Chem. Abstr.* 1994, *120,* 208198 z).

P. pinaster Ait. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Dehli, 1995, p. 568).

Composition of diterpene hydrocarbons of gum oleoresin determined (*Holzforschung* 1989, *43,* 359; *Chem. Abstr.* 1990, *113,* 187992 s).

PIPER (Piperaceae)

P. arborescens Roxb.; see *P. macropiper* Pennant

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P. attenuatum Buch.-Ham. ex Miq.; see *P. trioicum* Roxb.

P. aurantiacum Wall. ex Hook.f.; see *P. wallichii* (Miq.) Hand.-Mazz.

P. betle L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 568).

Oral administration of crude alcoholic extract of leaf stalk (1.25 and 1.5 g/kg daily for 30 consecutive days) manifested antifertility effect in male rats, leading to decrease in relative organ weights with 0 to 33.0% fertility rate, reduction in sperm count and sluggish motility. Significant increase ($P < 0.01$) in cholesterol (adrenal and testis) was also observed (*Indian J. Pharmacol.* 1990, *22,* 145).

Ursolic acid, its 3β-acetyl derivative, ursonic acid and β-sitosterol isolated (*Biochem. Soc. Trans.* 1993, *21,* 462; *Chem. Abstr.* 1993, *119,* 195314 m).

BIOLOGICAL ACTIVITY

Ursolic acid, 3β-acetylursolic acid and β-sitosterol in decreasing order of activity, inhibited arachidonic acid-induced platelet aggregation, whereas aggregation induced by platelet-activating factor was inhibited only by ursonic acid and β-sitosterol. Ursonic acid (25.0 to 100.0 mg/kg) exhibited concentration dependent anti-inflammatory activity (*Biochem. Soc. Trans.* 1993, *21,* 462: *Chem. Abstr.* 1993, *119,* 195314 m).

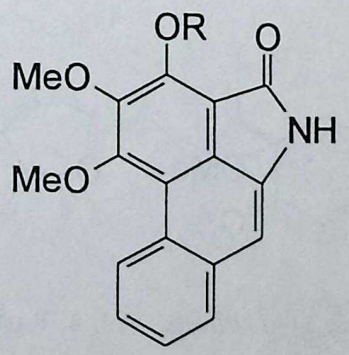
P. boehmeriifolium (Miq.) DC. (*boehmeriaefolium*)

Nep. - Bara pipla.

A new alkaloid - piperolactam C - isolated and its structure established (*Indian J. Chem.* 1989, *28*B, 775); another alkaloid - piperolactam D - isolated and characterised (*J. Nat. Prod.* 1990, *53,* 496); kadsurin A and isodihydrofutoquinol B from aerial parts (*Nat. Prod. Lett.* 1994, *4,* 35; *Chem. Abstr.* 1994, *121,* 129894 r).

Distribution: Eastern Himalayas and Assam, ascending to 1500 m.

NEW COMPOUNDS



Piperolactam C
R = Me
Piperolactam D
R = H

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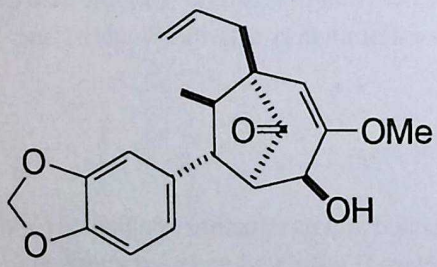
P. brachystachyum Wall. ex Hook.f.; see *P. mullesua* D.Don

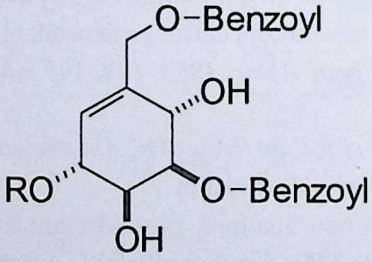
P. chaba Blume; see *P. retrofractum* Vahl

P. clarkei DC.

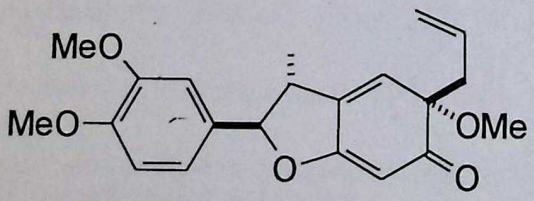
Two new oxygenated cyclohexanes - piperenol A and acetylpiperenol A - isolated and their structures established (*Phytochemistry* 1991, *30,* 871); a wax ester isolated from stems and leaves and characterised as 3-(4-hydroxyphenyl)propyl tetracosanoate; in addition, cyclohexane, (+)crotepoxide and β-sitosterol isolated (*Phytochemistry* 1992, *31,* 1035); stems and leaves yielded two new neolignans - clarkinol [rel-(7R,8R,1'S,3'R,4'S)1',2',3',4'-tetrahydro-4'-hydroxy-5'-methoxy-3,4-methylenedioxy-2'-oxo-7',3',8.1'-lignan-8'-ene] and (7R,8R,1'S),1',6'-dihydro-3,4,1'-trimethoxy-6'-oxo-7,0.4',8.3-lignan-8'-ene (I) as well as an isoprenylated phenol - 2-(3-methyl-2-butenyl)-3,4,5-trimethoxyphenol; in addition, velutin and (7R,8S,1'S)1',4'-dihydro-5'-methoxy-3,4-methylenedioxy-4'-oxo-8.1',7.0.2'-lignan-8'-ene (II) obtained (*Phytochemistry* 1994, *36,* 789).
Distribution: Assam.
NEW COMPOUNDS



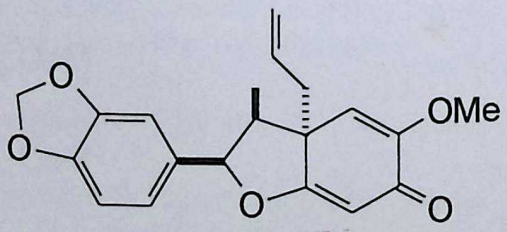
Clarkinol



Piperenol A
R = H
Acetylpiperenol A
R = Ac



I



II

P. cubeba L.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 569).

Isolation of a oxygenated cyclohexane - piperenol B - together with piperenol A, (+)crotepoxide and (+)zeylenol (*Phytochemistry* 1991, *30,* 871).

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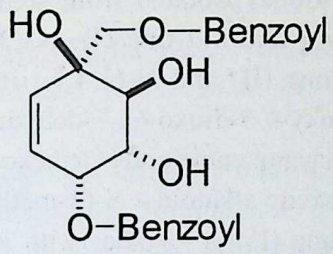
NEW COMPOUNDS



Piperenol B

P. falconeri DC.

N-Isobutyl-7-(3,4-methylenedioxyphenyl)hepta-2E,4E-dienamide, tectochrysin, apigenin dimethyl ether and β-sitosterol isolated from leaves and stems (*Indian J. Chem.* 1993, *32*B, 392).

Distribution: Khasi Hills and Meghalaya.

P. hamiltoni DC.

H. - Jangli paan.

Kadsurin A and isodihyrofutoquinol B isolated from aerial parts (*Nat. Prod. Lett.* 1994, *4*, 35; *Chem. Abstr.* 1994, *121*, 129894 r).

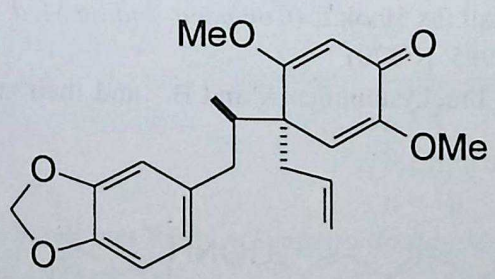
Distribution: Sikkim, West Bengal and Meghalaya, upto 900 m.

P. hookeri Miq.

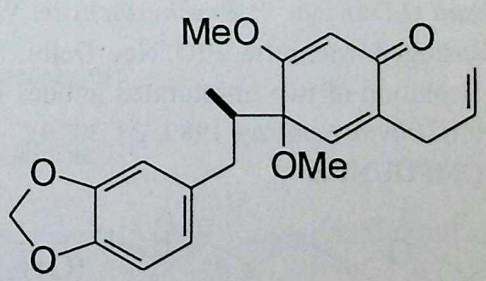
A new neolignan - hookerinone A - and isodihydrofutoquinol A and isodihydroquinol B isolated from roots and their structures elucidated (*Nat. Prod. Lett.* 1994, *4*, 35; *Chem. Abstr.* 1994, *121*, 129894 r).

Distribution: Western Ghats.

NEW COMPOUNDS



Hookerinone A



Isodihydrofutoquinol A (3'R)
Isodihydrofutoquinol B (3'S)

P. longum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 569).

Isolation of piperolactam C (*Indian J. Chem.* 1989, *28*B, 775).

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P. macropiper Pennant syn. *P. miniatum* Blume, *P. arborescens* Roxb.

Three new cytotoxic pyridones isolated from stems and characterised as N-(3,4-dimethoxycinnamoyl)-5,6-dihydropyridin-2-one (I), N-(3-methoxy-4,5-methylenedioxy-cinnamoyl)-5,6-dihydropyridin-2-one (II) and N-(3,4,5-trimethoxycinnamoyl)-5,6-dihydro-pyridin-2-one (III); 1,2,3-trimethoxy-4,5-dioxo-6a,7-dehydroaporphine, 1,2-dimethoxy-4,5-dioxo-6a,7-dehydroaporphine, (+)diayangambin and (+)epiexcelsin also isolated (*Phytochemistry* 1990, *29*, 2689); another new cytotoxic alkaloid - N-(3-methoxy-4,5-methylenedioxydihydro-cinnamoyl)-5,6-dihydropyridin-2-one (IV) - together with known cytotoxic alkaloids, N-(3-methoxy-4,5-methylenedioxycinnamoyl)-5,6-dihydropyridin-2-one, piplartine and piplartine dimer A isolated from leaves (*J. Nat. Prod.* 1990, *53*, 1575).

Distribution: Ketehal Island in Nicobar Islands.

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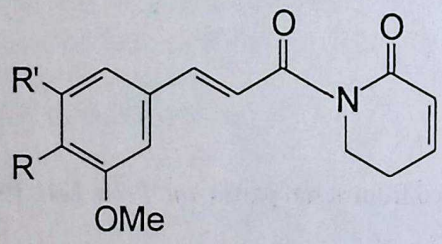
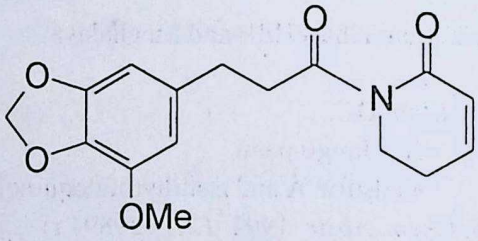




I

R = OMe, R' = H

II

RR' = $-OCH_2O-$

III

R,R' = OMe

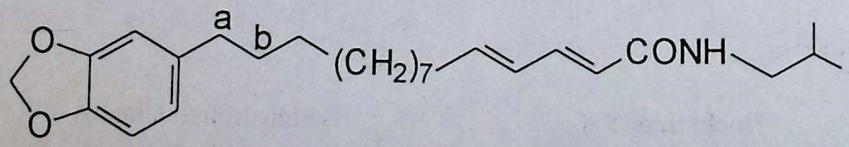
IV

P. miniatum Blume; see *P. macropiper* Pennant

P. mullesua D.Don syn. *P. brachystachyum* Wall. ex Hook.f. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 570).

Isolation of two unsaturated amides - brachystamides A and B - and their structure elucidation (*Phytochemistry* 1989, *28*, 3039).

NEW COMPOUNDS



Brachystamide A

Brachystamide B

ab = Δ

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P. nigrum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 570).

(E)β-Ocimene, δ-guaiene, (ZE)farnesol, δ-cadinol and guaiacol identified in volatile oil by GC-MS (*Nahrung* 1990, *34,* 555; *Chem. Abstr.* 1991, *115,* 27893 y).

BIOLOGICAL ACTIVITY

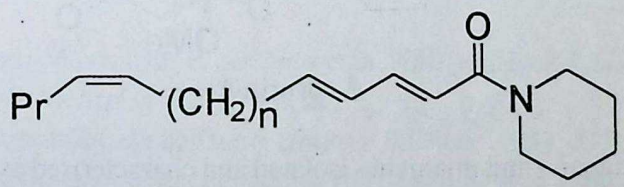
Piperine (25.0-100.0 μM) significantly stimulated γ-glutamyl transpeptidase activity, enhanced uptake of labelled (–)leucine, (–)isoleucine and (–)valine and increased lipid peroxidation in freshly isolated epithelial cells of rat jejunum, which would suggest that it interacts with lipid environment to produce effects which lead to increased permeability of intestinal cells (*Biochem. Pharmacol.* 1992, *43,* 1401; *Chem. Abstr.* 1992, *116,* 248386 h).

P. officinarum Cass. ex DC.; see *P. retrofractum* Vahl

P. retrofractum Vahl syn. *P. chaba* Hunter (non Blume), *P. officinarum* Cass. ex DC. (*Compend. Indian Med. Plant,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 571).

Two new piperidine alkaloids - piperoctadecalidine and pipereicosalidine - together with piperine, pipernonaline and guineensine isolated from fruits and structures of new compounds established (*Phytochemistry* 1992, *31,* 3609; *Bull. Korean Chem. Soc.* 1992, *13,* 388; *Chem. Abstr.* 1992, *117,* 230116 f); isolation and structure elucidation of N-isobutyl-2E,4E,14Z-eicosatrienamide, N-isobutyl-2E,4E,12Z-octadecatrienamide, 1-(octadeca-2E,4E,12Z-trienoyl)piperidine, 1-(eicosa-2E,4E,14Z-trienoyl)piperidine, 1-(octadeca-2E,4E-dienoyl)-piperidine, 1-(eicosa-2E,4E-dienoyl)piperidine and 1-(eicosa-2E,14Z-dienoyl) piperidine from fruits (*Biosci., Biotechnol., Biochem.* 1993, *57,* 1329; *Chem. Abstr.* 1993, *119,* 266517 t).

NEW COMPOUNDS



Piperoctadecalidine
n = 8
Pipereicosalidine
n = 10

P. sarmentosum Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 571).

1-Allyl-2,6-dimethoxy-3,4-methylenedioxybenzene together with 1-allyl-2,4,5-trimethoxybenzene, 1-(1(E)-propenyl)-2,4,5-trimethoxybenzene and 1-allyl-2-methoxy-4,5-methylenedioxybenzene isolated from leaves (*Phytochemistry* 1991, *30,* 3227).

BIOLOGICAL ACTIVITY

1-Allyl-2,6-dimethoxy-3,4-methylenedioxybenzene exhibited antimicrobial activity against *Escherichia coli* and *Bacillus subtilis* (*Phytochemistry* 1991, *30,* 3227).

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P. schmidtii Hook.f.

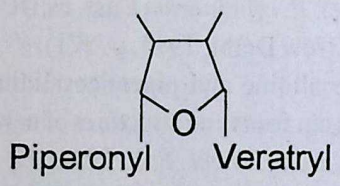
Eng. - Nilgiri pepper.

Hexane extract showed antiamoebic activity *in vitro* at 1.0 mg/ml (*J. Nat. Prod.* 1990, *53*, 479).

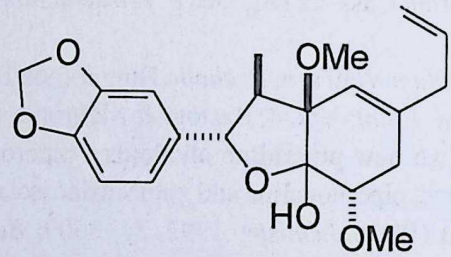
A new neolignan - schmiditin - isolated and its structure elucidated; galgravin, friedelin, 1-triacontanol, octacosanoic acid, β-sitosterol and its glucoside also isolated (*J. Nat. Prod.* 1990, *53*, 479); a new lignan - (–)machilin G - along with (+)calopiptin, (–)zuionin A as well as a neolignan - kadsurin A - and futoquinol, isodihydrofutoquinols A and B isolated from leaves and stems (*Phytochemistry* 1993, *32*, 445).

Distribution: Assam, Western Ghats, Nilgiris & Palni Hills in Tamil Nadu, ascending to 1500 m.

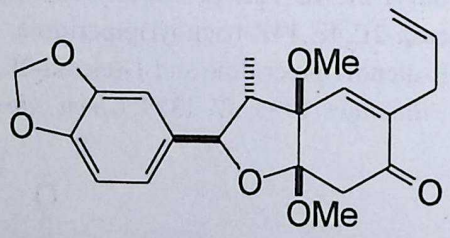
NEW COMPOUNDS



(-)Machilin G



Schmiditin



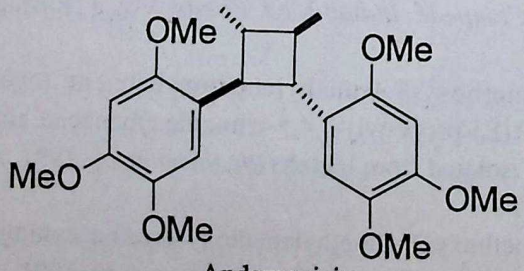
Kadsurin A

P. sumatranum DC.

A new neolignan - andamanicin - isolated and characterised as 1α,2β-dimethyl-3α,4β-bis(2,4,5-trimethoxyphenyl)cyclobutane; asarinine, asarone, asaralaldehyde, triacontane, sitosterol and 3-(2,5-dimethoxy-3,4-methylenedioxyphenyl)-1,2-dihydroxypropane also obtained (*Phytochemistry* 1990, *29*, 2733).

Distribution: Andaman Islands.

NEW COMPOUNDS



Andamanicin

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P. sumatranum DC. var. *andamanica*

A new phenylpropanoid - 1-(2,4,5-trimethoxyphenyl)-1-hydroxy-2-methoxypropane - isolated (*Phytochemistry* 1993, *32,* 478).

Distribution: Andaman Islands.

P. sylvaticum Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 572).

Structure and stereochemistry of sylvone established by NMR studies (*J. Indian Chem. Soc.* 1992, *69,* 321).

P. sylvestre Lamk.

Safrole (32.1), eugenol (16.4), its acetate (6.6), β-selinene (2.8), sabinene (2.6), γ-terpinene (1.7) and trans-caryophyllene (1.6%) togther with fifteen other minor components determined in essential oil from leaves of Mauritius plants (*Planta Med.* 1994, *60,* 376).

Distribution: Assam and Deccan Peninsula.

P. trioicum Roxb. syn. *P. attenuatum* Buch.-Ham. ex Miq. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 505).

Piperolactam D isolated (*J. Nat. Prod.* 1990, *53,* 496); β-caryophyllene as major constituent of berry oil and β-bisabolene as major constituent of stem oil detected by GC-MS (*Indian Perfum.* 1990, *34,* 182; *Chem. Abstr.* 1991, *114,* 171012 g); 8-hentriacontanol along with pipoxide chlorohydrin and (–)galbelgin isolated from leaves (*Phytochemistry* 1991, *30,* 2075); crotepoxide, pipoxide, its chlorohydrin, (–)galbelgin and tetratriacontanoic acid obtained from berries whereas stem contained pipoxide and β-sitosterol (*Fitoterapia* 1993, *64,* 281).

P. wallichii (Miq.) Hand.-Mazz. syn. *P. aurantiacum* Wall. ex Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 573).

Synthesis of aurantiamide benzoate (*Indian J. Chem.* 1993, *32*B, 776); a new lignan - wallichinine - along with kadsurenone, denudatin B, N-isobutyldeca-trans-2-trans-4-dienamide, hancinone C, galgravin, dihydropiperlonguminine and crotepoxide isolated (*Yaoxue Xuebao* 1989, *24,* 438; *Chem. Abstr.* 1990, *112,* 91459 b).

BIOLOGICAL ACTIVITY

Wallichinine, kadsurenone, denudatin B, hancinone C and galgravin inhibited platelet aggregation caused by platelet-activating factor (*Yaoxue Xuebao* 1989, *24,* 438; *Chem. Abstr.* 1990, *112,* 91459 b).

P. wightii Miq.

Two new neolignans - (7R,8R,3'R)7-acetoxy-3',4'-dimethoxy-3,4-methylenedioxy-6'-oxo-1',4',8'-triene-8.3'-lignan (I) and (7R,8R,3'R)7-hydroxy-3',4'-dimethoxy-3,4-methylene-dioxy-6'-oxo-1',4',8-triene-8.3'-lignan (II) - isolated from stems and their structures determined;

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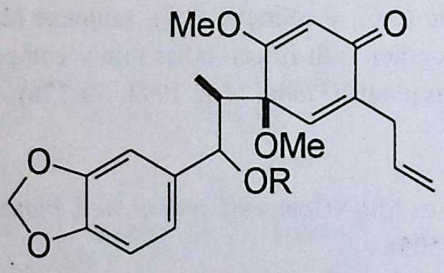
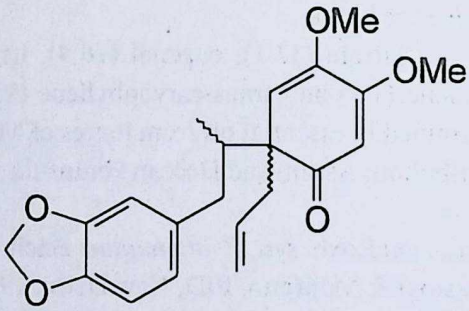
isodihydrofutoquinols A and B, lacifolins C and D, wallichinine, calopiptin and machilin G also isolated; fruits afforded lignan (II), isodihydrofutoquinol B, lancifolin C, wallichinine and gelbelgin (*Tetrahedron* 1994, *50,* 2231); stems afforded three more neolignans - 4',5'-dimethoxy-3,4-methylenedioxy-2'-oxo-3',5',8'-triene-8.1'-lignan (III), iso-4',5'-dimethoxy-3,4-methylenedioxy-2'-oxo-3',5',8'-triene-8.1-lignan (IV) and 1',2'-dimethoxy-3,4-methylenedioxy-4'-oxo-2',5',8'-triene-8.5'-lignan (V); in addition, a tetrahydrofuran lignan - rel-(7S,8S,7'S,8'S)3',4'-dimethoxy-3,4-methylenedioxy-8.8',7.0.7-lignan - along with fargesone A and fargesone B isolated (*Tetrahedron* 1994, *50,* 10579).

Distribution: The Nilgiris and Hills of Travancore.

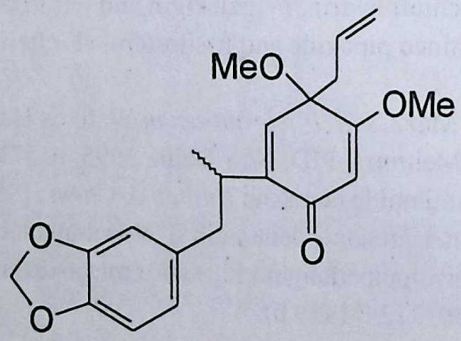
NEW COMPOUNDS



I
R = Ac
II
R = H



III & IV



V

PISCIDIA (Papilionaceae)

P. erythrina L. syn. *P. priscipula* (L.) Sarg. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 542).

Isolation of a new amino isoflavone - piscerythramine - from root bark and its structure elucidation (*Tetrahedron Lett.* 1990, *31,* 6667; *Phytochemistry* 1993, *32,* 1317); four new isoflavones - piscerythrinetin, its 2'-hydroxy derivative, isowighteone and 8-prenyllisetin - from

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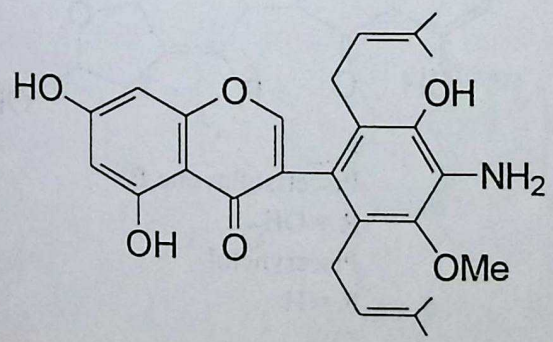
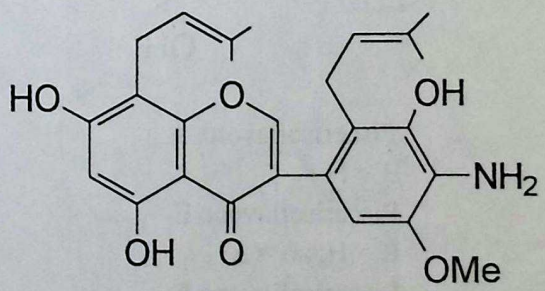
root bark and their characterisation; in addition, rotenone, lisetin, ichthynone, piscidone, piscerythrone, its 2'-deoxy and 6'-prenyl derivatives and 3',5'-diprenylgenistein isolated; structure of piscidone proposed (*Z. Naturforsch.* 1989, *44*C, 905; *Chem. Abstr.* 1990, *112,* 195239 w); isolation of two new pyranorotenoids - (+)erythynone and (+)12a-hydroxythynone - from root bark of Jamaican plant along with (–)rotenone, (–)12a-hydroxyrotenone and (-)villosinol and structure elucidation of new compounds; durmillone isolated from roots (*Z. Naturforsch.* 1990, *45*C, 154; *Chem. Abstr.* 1990, *113,* 94779 n); a new coumaronochromanone - piscerythrol - isolated and its structure determined (*Z. Naturforsch.* 1991, *46*C, 331; *Chem. Abstr.* 1991, *115,* 131974 m); two new flavonoids - hernancorzine and sanchemarroquin - isolated from bark and their structures established; in addition, ictinone and piscidione isolated (*Rev. Latinoam. Quim.* 1991, *22,* 94; *Chem. Abstr.* 1993, *119,* 113372 s); structure of 6'-prenylpiscerythrone revised and found to be identical to that of erythbigenin (*Phytochemistry* 1991, *30,* 2769; *ibid.* 1993, *34,* 303); piscigenin, junipegenin A and erythgenin isolated from root bark (*Phytochemistry* 1991, *30,* 2769); earlier structure of piscidone revised (*Phytochemistry* 1992, *31,* 679; *ibid.* 1993, *34,* 303); seven new isoflavones - isopiscerythrone, allolicoisoflavone A, piscidanone, piscerygenin, piscisoflavones A, B and C - isolated from root bark and characterised (*Phytochemistry* 1992, *31,* 683); new isoflavonoid - isopiscerythramine - isolated from root bark and its structure established (*Phytochemistry* 1993, *32,* 1317); piscerythoxazole also isolated and characterised (*Phytochemistry* 1993, *32,* 1317; *ibid.* 1993, *34,* 303); two new coumaronochromones - lisetinone and lisetin hydrate - two new deoxyisoflavones - dalpatein, piscisoflavone D, a new piscidone derivative - piscidanol - , a new erythbigenin derivative - erythbigeneol -, ten piscerythrone-type isoflavones - trans-hydroxypiscerythrone, piscerythrone hydrate, 2'-hydroxypiscerythrinetin, pisceri-isoflavones A, B, C, D, E, F and G - , two 2'-deoxypiscerythrones - piscerynetol and piscerynetin - isolated from root bark of Jamaican plant, along with piscidone, ichthynone and piscerythrone and characterised (*Phytochemistry* 1993, *34,* 303); in addition, four new isoflavones, in the form of two pairs of atropisomers - erythbigenones A and B and erythbigenols A and B - isolated from root bark of Jamaican plant and their relative stereochemistries established (*Phytochemistry* 1993, *34,* 303, 545).

NEW COMPOUNDS



Piscerythramine



Isopiscerythramine

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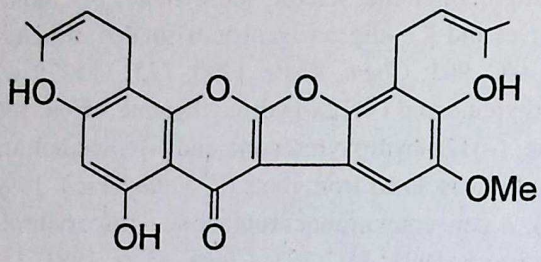
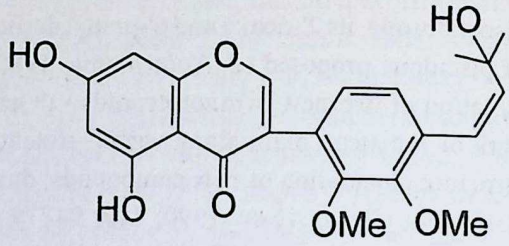
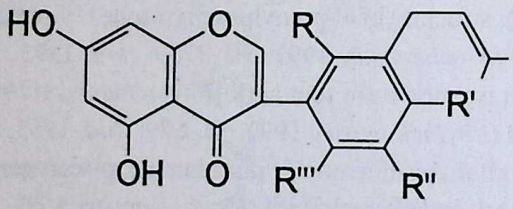


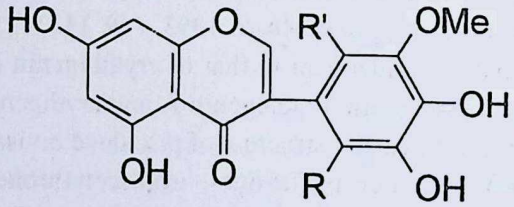
8-Prenyllisetin



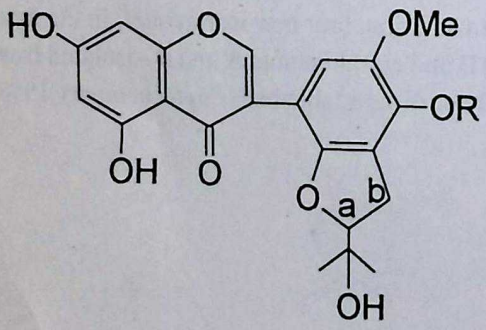
Piscerynetin



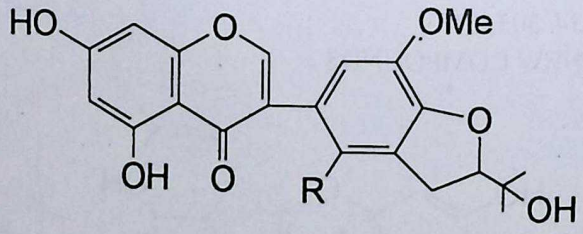
Piscerythrinetin
R,R''' = H, R',R'' = OMe
2'-Hydroxypiscerythrinetin
R = OH, R',R'' = OMe, R''' = H
Isowighteone
R,R'',R''' = H, R' = OH



Erythbigenin
R,R' = Prenyl
Piscidone
R = Prenyl, R' = H



Piscerisoflavone A
R = H
Piscerisoflavone E
R = H, ab = Δ
Piscerisoflavone F
R = Me



Piscerisoflavone B
R = OH
Piscerynetol
R = H

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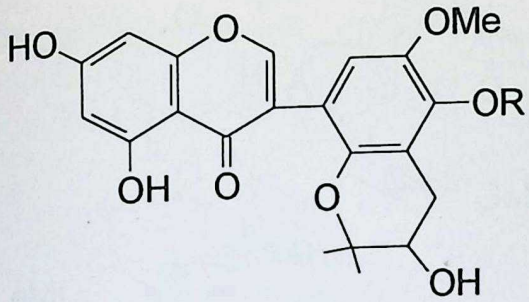
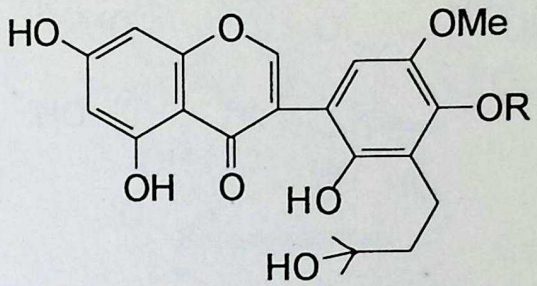
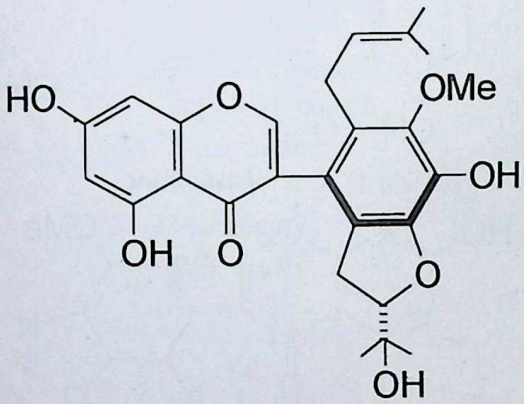


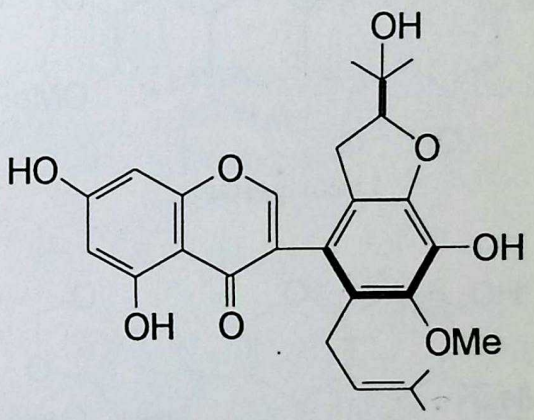
Piscerisoflavone C
R = H
Piscerisoflavone G
R = Me



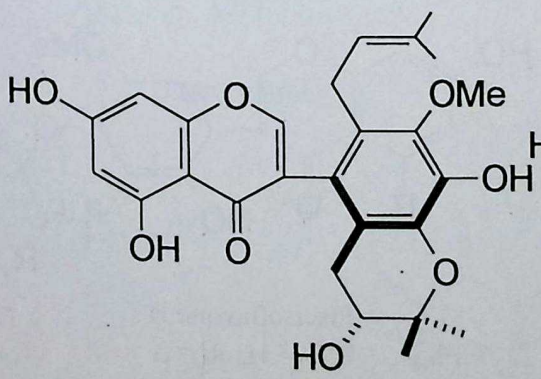
Piscerythrone hydrate
R = H
2-Hydroxypiscerythrinetinhydrate
R = Me



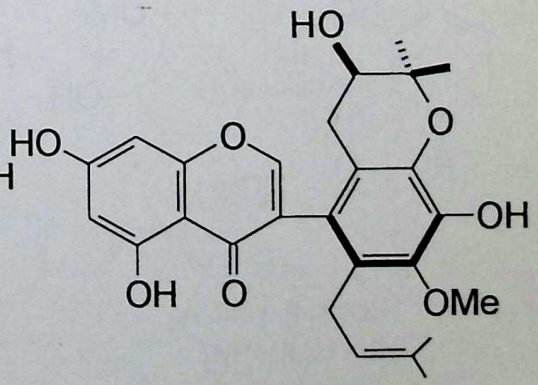
Erythbigenol A



Erythbigenol B



Erythbigenone A



Erythbigenone B

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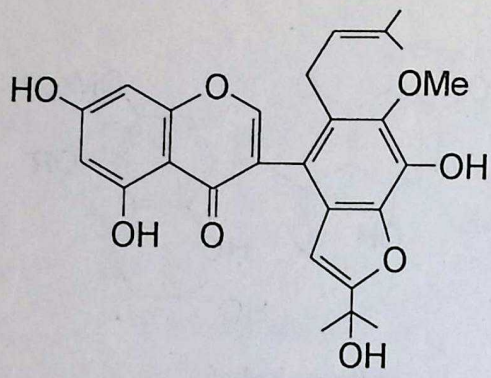
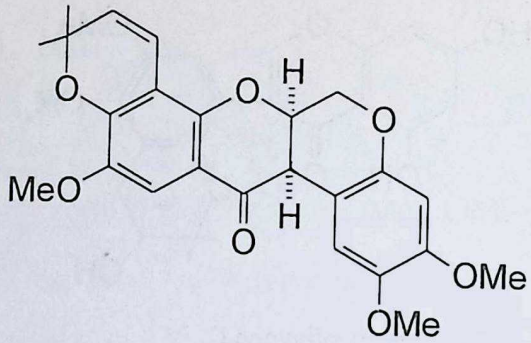
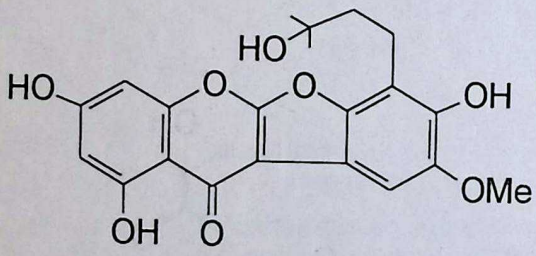


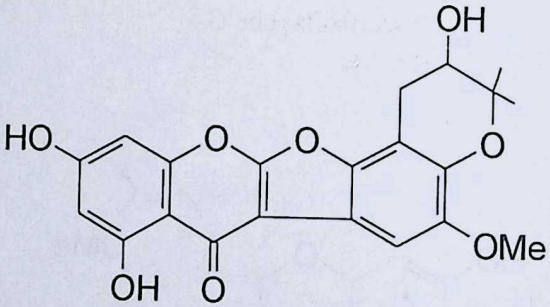
Erythbigeneol



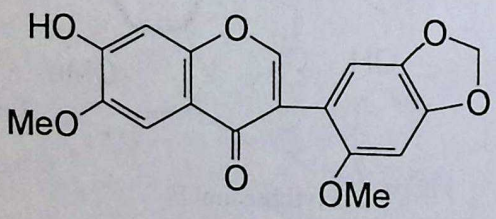
(+) Erythynone



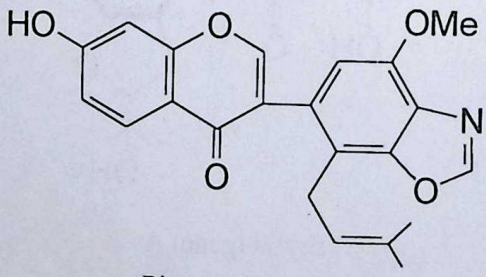
Lisetin hydrate



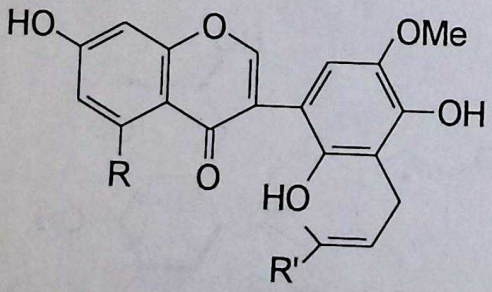
Lisetinone



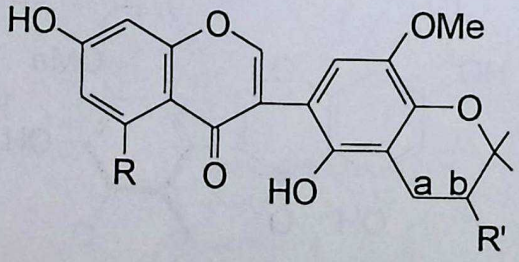
Dalpatein



Piscerythoxazole



Piscisoflavone A
R = H, R' = Me
Trans-hydroxypiscerythrone
R = OH, R' = CH_2OH



Piscisoflavone B
R,R' = H, ab = Δ
Piscerisoflavone D
R,R' = OH

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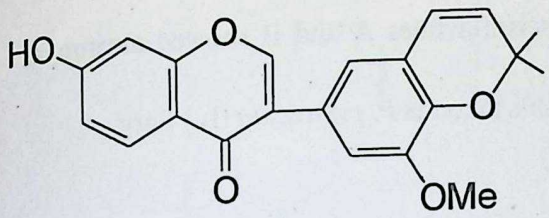
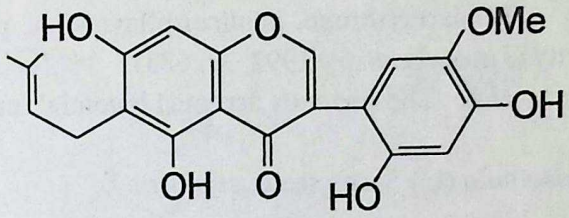
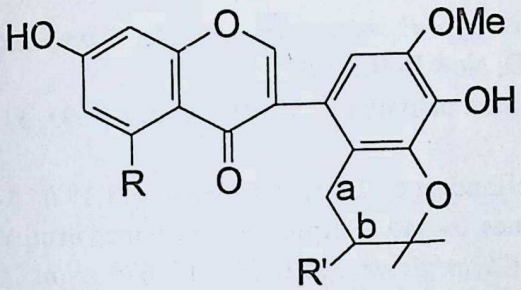


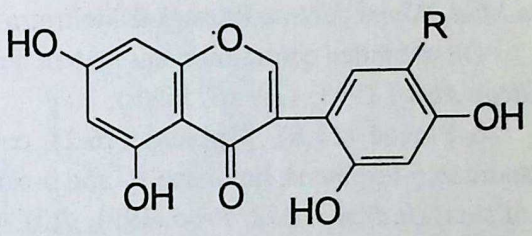
Piscisoflavone C



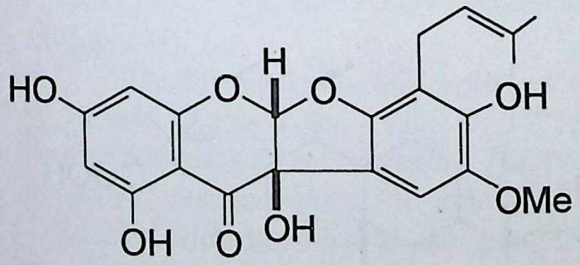
Isopiscerythrone



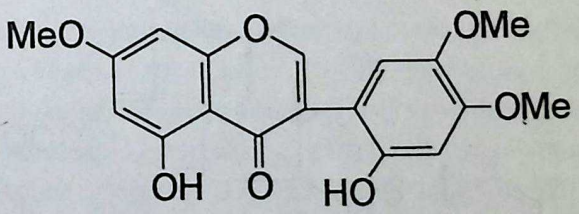
Piscisoflavone D
R,R' = H, ab = Δ
Piscidanone
R = OH, R' = H, ab = Δ
Piscidanol
R,R' = OH



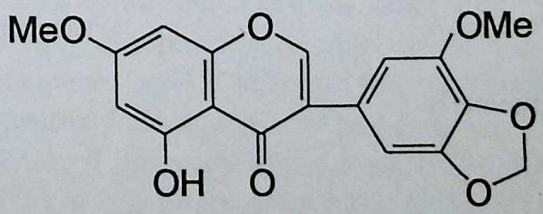
Allolicoisoflavone A
R = Prenyl
Piscerygenin
R = OMe



Piscerythrol



Hernancorzine



Sanchemarroquin

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BIOLOGICAL ACTIVITY

Isopiscerythrone, allolicoisoflavone A, piscisoflavones A and B showed antifungal activity (*Phytochemistry* 1992, *31*, 683).

Note: The currently accepted binomial for this taxon is *P. priscipula* (L.) Sarg.

P. priscipula (L.) Sarg.; see *P. erythrina* L.

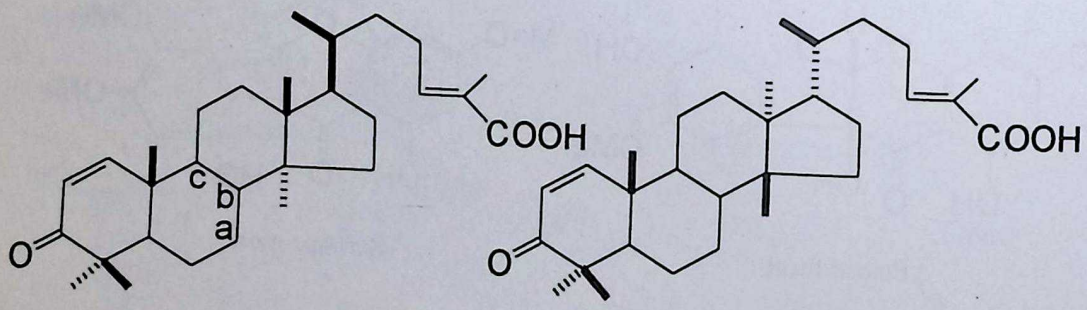
PISTACIA (Anacardiaceae)

P. chinensis Bunge ssp. *integerrima* (Stewart) Rech.f. syn. *P. integerrima* Stewart (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 574).

Oil exhibited central nervous system depressant activity (*Int. J. Pharmacog.* 1993, *31*, 89; *Chem. Abstr.* 1993, *119*, 167562 x).

α-Pinene (21.8), β-pinene (16.2), α-phellandrene (15.5), car-3-ene (11.1%), β-phellandrene, γ-terpinene, limonene, α- and β-ocimenes, α- and β-terpineols determined in oil of galls of stem (*Indian J. Nat. Prod.* 1991, *7*(2), 15; *Chem. Abstr.* 1992, *117*, 167679 z; *Int. J. Pharmacog.* 1993, *31*, 89; *Chem. Abstr.* 1993, *119*, 167562 x); three tetracyclic triterpenoids - pistacigerrimones A, B and C - isolated from galls and characterised as 20(R),24(R)3-oxo-9β-lanosta-1(2),7,24-trien-26-oic acid, 20(R),24(R)3-oxo-9β-lanosta-1(2),8,24-trien-26-oic acid and 20(R),24(R)3-oxo-tirucalla-1(2),24-dien-26-oic acid respectively (*Pharmakeutike* 1992, *5*, 171; *Chem. Abstr.* 1993, *118*, 230158 s; *Pharmazie* 1993, *48*, 215; *Chem. Abstr.* 1993, *119*, 91231 r); three more tetracyclic triterpenes - pistacigerrimones D, E and F - from galls and their characterisation (*Pharmazie* 1994, *49*, 356; *Chem. Abstr.* 1994, *121*, 226359 c).

NEW COMPOUNDS



Pistacigerrimone A
ab = Δ
Pistacigerrimone B
bc = Δ

Pistacigerrimone C

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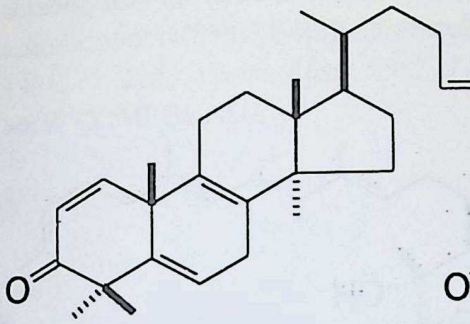
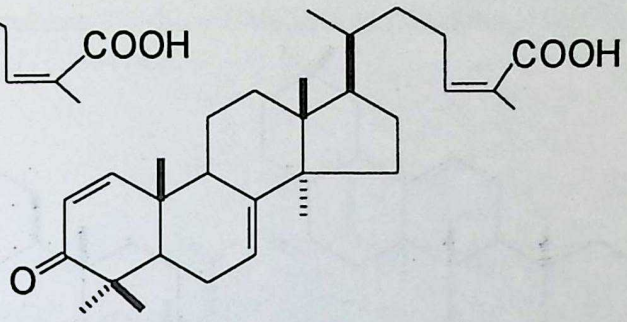
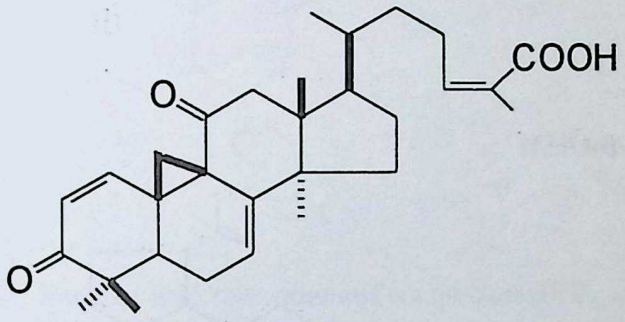


Pistacigerrimone D



Pistacigerrimone E



Pistacigerrimone F

P. integerrima Stewart; see *P. chinensis* Bunge ssp. *integerrima* (Stewart) Rech.f.

P. lentiscus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 574).

Identification of α- and β-pinenes, myrcene, limonene, thymol and carvacrol in fruits by GC-MS (*J. Food Sci.* 1990, *55,* 1325; *Chem. Abstr.* 1991, *115,* 47931 n); two new nortriterpenoids (I, II) and two ketones (III, IV) isolated from resin and their structures determined as 3-oxo-28-norolean-12-ene, 3β-hydroxy-28-norolean-12-ene, 8(R)-3-oxo-8-hydroxypolypoda-13E,17E,21-triene and 3-oxo-28-norlup-20(29)-ene respectively (*Phytochemistry* 1991, *30,* 3709); chemical composition of essential oils from mastic gum, leaves, unripe and ripe fruits determined; gum oil contained monoterpene hydrocarbons (90.0%) consisting of α-pinene (79.0%) and β-myrcene (3.0%); leaf oil contained monoterpene hydrocarbons (50.0%), oxygen-containing monoterpenes (20.0%) and sesquiterpenes (25.0%), main constituents of leaf oil were α-pinene (11.0%), β-myrcene (19.0%), α-terpineol and terpinen-4-ol; fruit oil contained monoterpene hydrocarbons and sesquiterpenes (2.0-3.0%), unripe fruit oil consisted of α-pinene (22.0) and β-myrcene (54.0%) whereas ripe fruit oil consisted of α-pinene (11.0) and β-myrcene (72.0%); undecan-2-one (0.1-0.6%) and dimyrcene (four isomers) (0.5-4.4%) detected in all the oils (*Flavour Fragrance J.* 1991, *6,* 271; *Chem. Abstr.* 1992, *116,* 135985 j); a polymeric procyanidin glycoside isolated (*Pharmazie* 1992, *47,* 466; *Chem. Abstr.* 1992, *117,* 103940 v).

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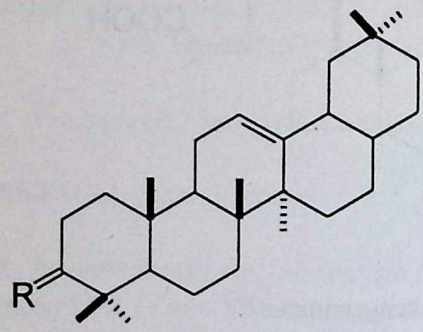
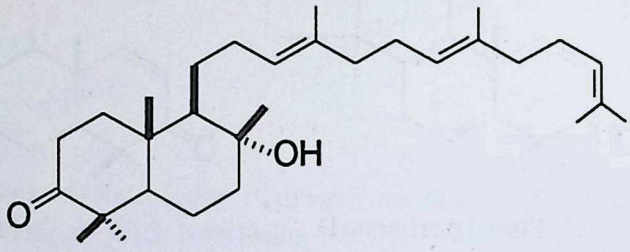
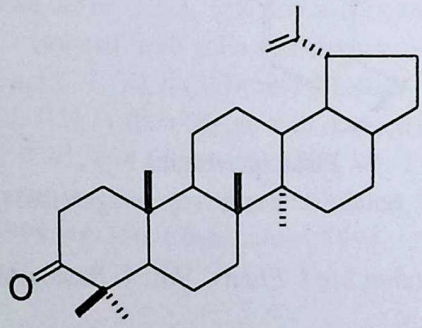
NEW COMPOUNDS





I
R = O
II
R = β-OH,H

III



IV

BIOLOGICAL ACTIVITY

The polymeric procyanidin glycoside exhibited hypotensive activity (*Pharmazie* 1992, *47,* 466; *Chem. Abstr.* 1992, *117,* 103940 v).

PISTIA (Araceae)

P. stratiotes L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 544).

Isolation of a new stigmastane (I) and its characterisation as 11α-hydroxy-24(S)ethyl-5α-cholest-22-ene-3,6-dione; NMR assignments of 11α-hydroxy-5α-cholestane-3,6-dione revised (*Phytochemistry* 1991, *30,* 2420); three new sitosterol acylglycosides isolated and their structures elucidated as sitosterol-3-O-[2',4'-O-diacetyl-6'-O-stearyl]-β-D-glucopyranoside, sitosterol-3-O-[2'-O-stearyl]-β-D-xylopyranoside and sitosterol-3-O-[4'-O-stearyl]-β-D-xylopyranoside (*Phytochemistry* 1991, *30,* 2422); linoleic, γ-linolenic, (12R,9Z,13E,15Z)12-hydroxy-9,13,15-

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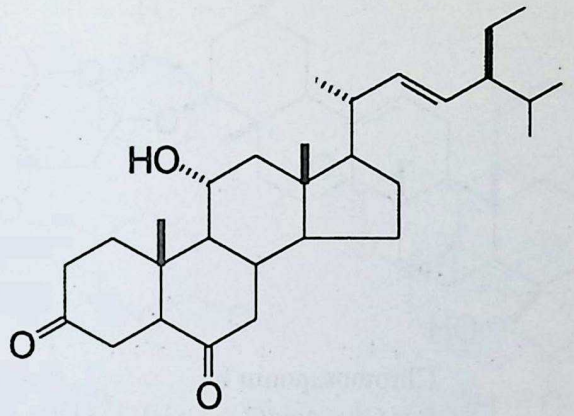
octadecatrienoic (II) and (9S,10E, 12Z,15Z)9-hydroxy-10,12,15-octadecatrienoic acids (III), α-asarone and 24(S)ethyl-4,22-cholestadiene-3,6-dione (IV) isolated from foliage (*J. Chem. Ecol.* 1991, *17,* 2223; *Chem. Abstr.* 1992, *116,* 80474 j).

NEW COMPOUNDS



I

BIOLOGICAL ACTIVITY

Linoleic acid, γ-linolenic acid, α-asarone and compounds (II, III and IV) inhibited growth of some microalgae in solid medium (*J. Chem. Ecol.* 1991, *17,* 2223; *Chem. Abstr.* 1992, *116,* 80474 j).

PISUM (Papilionaceae)

P. sativum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 574).

Extract of roots of seedlings exhibited adenyl cyclase activity (*Phytochemistry* 1993, *34,* 899).

β-(Isoxazolin-5-on-2-yl)-alanine isolated from extract and exudate of roots of pea seedlings (*Biol. Fertil. Soils* 1991, *11,* 203; *Chem. Abstr.* 1992, *116,* 124848 r); conformational analysis of xyloglucan isolated from stems (*Int. J. Biol. Macromol.* 1990, *12,* 218; *Chem. Abstr.* 1990, *113,* 168975 x); N^6-methylagmatine identified in seeds and seedlings (*Phytochemistry* 1990, *29,* 1313); seeds contained 24-epiclerosterol, 24α- and 24β-methyl-5α-cholest-8(14)-en-3β-ols, 24α-ethyl-5α-cholest-8(14)-en-3β-ol, 14α,24α- and 14α,24β-dimethyl-5α-cholest-9(11)-en-3β-ols, 14α-methyl-24α-ethyl-5α-cholest-9(11)-en-3β-ol, 14α-methyl-24β-ethyl-5α-cholesta-9(11),25-dien-3β-ol and β-sitosterol (*Phytochemistry* 1992, *31,* 1765); a new γ-pyronyl triterpenoid saponin - chromosaponin I - isolated and characterised (*Phytochemistry* 1992, *31,* 2435; *Chem. Lett.* 1994, 711; *Chem. Abstr.* 1994, *121,* 36072 f); the polyamines, canavalmine, homospermine, aminopropylcanavalmine, thermospermine and aminopropylhomospermidine identified in seeds (*Can. J. Bot.* 1992, *70,* 1984; *Chem. Abstr.* 1993, *118,* 98056 a); L-4-chlorotryptophan isolated

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from immature seeds; absolute stereochemistry of N-malonyl-4-chlorotryptophan reassigned (*Tetrahedron Lett.* 1993, *34,* 1057); isolation of pectins and hemicelluloses from pea hulls (*Carbohydr. Polym.* 1994, *24,* 139; *Chem. Abstr.* 1994, *121,* 200917 h).

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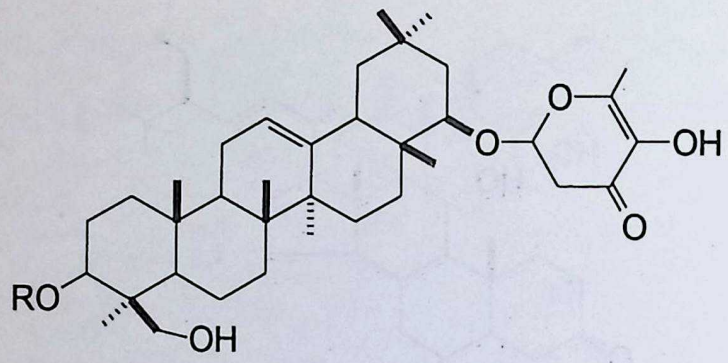

Chromosaponin I
R = Gluc.acid(2→1)Gal(2→1)Rha

BIOLOGICAL ACTIVITY

β-(Isoxazolin-5-on-2-yl)-alanine exhibited potent growth inhibitory activity against a wide range of phytopathogenic fungi (*Biol. Fertil. Soils* 1991, *11,* 203; *Chem. Abstr.* 1992, *116,* 124848 r); chromosaponin I reduced 1,4-benzoquinone, some of its derivatives and cytochrome (*Chem. Lett.* 1994, 711; *Chem. Abstr.* 1994, *121,* 36072 f); it also inhibited oxidation of soybean phosphatidylcholine liposomal membrane induced by a water-soluble radical initiator, 2,2'-azobis(2-amidinopropane) dihydrochloride (*Biosci., Biotechnol., Biochem.* 1994, *58,* 1731; *Chem. Abstr.* 1994, *121,* 226458 j).

PITHECELLOBIUM (Mimosaceae)

P. dulce (Roxb.) Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 575).

A polysaccharide consisting of galactose and mannose in molar ratio of 1:3 isolated from seeds (*Proc. Natl. Acad. Sci. India* 1992, *62*A, 1; *Chem. Abstr.* 1994, *121,* 129914 x); seeds of plant from Vidarbha region contained lipids, phospholipids and glycolipids; palmitic, stearic, oleic and linoleic acids as well as small amounts of myristic, linolenic and arachidic acids identified by GLC in seeds (*Indian J. Pharm. Sci.* 1992, *54,* 105).

PITYROGRAMMA (Hemionitidaceae)

P. calomelanos (L.) Link syn. *Pteris calomelanos* (L.) Bedd., *Pellaea calomelanos* (L.) Link (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 508).

Three new 5,7-dihydroxydihydroneoflavones - calomelanols A, B and C - isolated from exudate and characterised (*Phytochemistry* 1991, *30,* 3091); isolation of a new complex flavonoids

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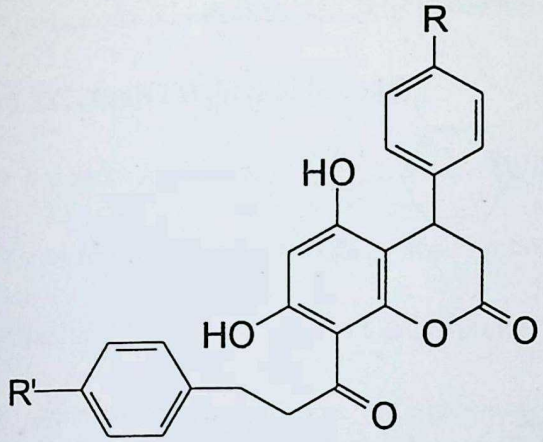
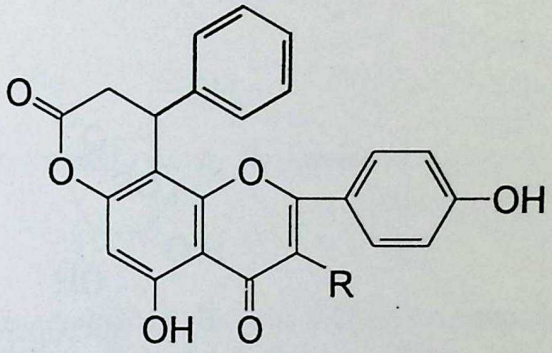
- calomelanols D and E - from farinose exudate and their structure elucidation (*Heterocycles* 1992, *33*, 229); five more flavonoids - calomelanols F, G, H, I and J - from exudate and their structure elucidation (*Phytochemistry* 1992, *31*, 2487).

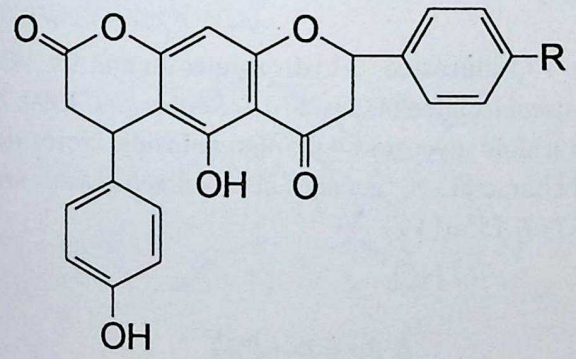
NEW COMPOUNDS



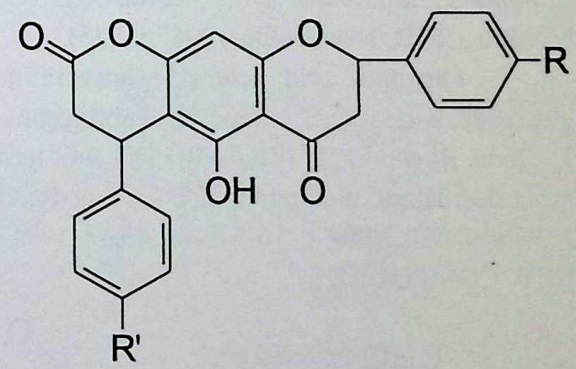
Calomelanol A
R = H, R' = OMe
Calomelanol B
R = H, R' = OH
Calomelanol C
R = OH, R' = H



Calomelanol D
R = OH
Calomelanol F
R = H



Calomelanol E
R = OH
Calomelanol G
R = OMe



Calomelanol H
R = OH, R' = H
Calomelanol I
R = H, R' = OH
Calomelanol J
R,R' = H

PLANTAGO (Plantaginaceae)

P. asiatica L.; see *P. major* L. ssp. *major*

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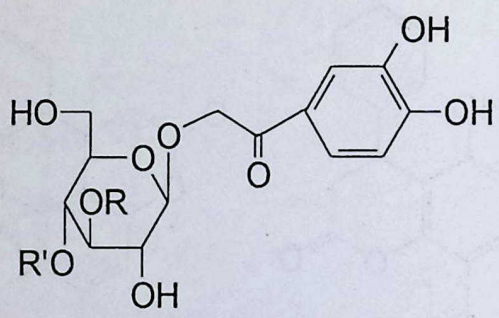
P. depressa Willd. syn. *P. tibetica* Hook.f. & Thoms. ex Hook.f.

A new phenylethanoid glycoside - β-oxoacteoside - isolated from aerial parts and its structure elucidated; in addition, cistanoside F, β-hydroxyaceteoside, campenoside I, acteoside and orobanchoside isolated (*Phytochemistry* 1993, *32,* 975).

Distribution: Himalayas, Kashmir and Himachal Pradesh, alt. 1200-3300 m.

NEW COMPOUNDS



β-Oxoacteoside

R = Rhamnose, R' = Caffeoyl

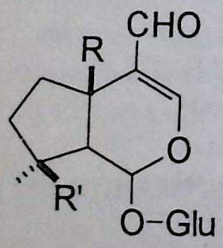
P. lanceolata L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 575).

Aucubin, catalpol, globularin and desacetylasperulosidic acid methyl ester isolated (*Z. Naturforsch.* 1991, *46*C, 493; *Chem. Abstr.* 1992, *116,* 37960 c).

P. major L. ssp. *major* syn. *P. asiatica* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 575).

Oleanolic acid, acteoside, luteolin, its 7-O-glucoside, 6-hydroxyluteolin and its 7-O-glucoside, β-sitosterol, campesterol and stigmasterol isolated (*Mansoura J. Pharm. Sci.* 1990, *6,* 1; *Chem. Abstr.* 1991, *115,* 155013 y); four new iridoid glycosides - plantarenaloside, ixoroside, asperuloside and melampyroside - isolated and characterised; aucubin also isolated (*Mansoura J. Pharm. Sci.* 1990, *6,* 16; *Chem. Abstr.* 1991, *115,* 155014 z).

NEW COMPOUNDS

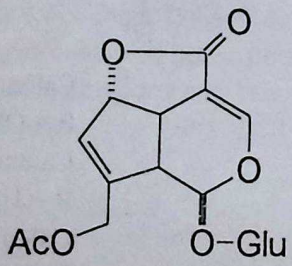


Ixoroside

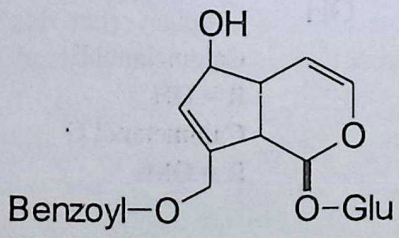
R = H, R' = OH

Plantarenaloside

R = OH, R' =H



Asperuloside



Melampyroside

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P. tibetica Hook.f. & Thoms. ex Hook.f.; see *P. depressa* Willd.

PLATYCLADUS (Cupressaceae)

P. orientalis (L.) Franco; see *Thuja orientalis* L.

PLECTRANTHUS (Lamiaceae)

P. barbatus Andr.; see *Coleus forskohlii* (Willd.) Briq.

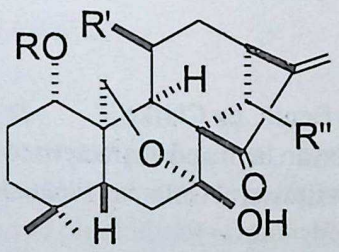
P. coesta Buch.-Ham. ex D.Don; see *P. japonicus* (Burm.f.) Koidz. var. *japonicus*

P. incanus Link; see *P. mollis* (Ait.) Spreng.

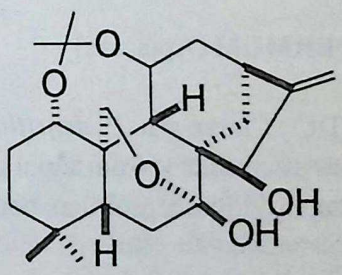
P. japonicus (Burm.f.) Koidz. var. *japonicus* syn. *P. coesta* Buch.-Ham. ex D.Don, *P. menthoides* Benth., *Rabdosia coetsa* (Buch.-Ham. ex D.Don) Hara (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 577).

New ent-kaurene diterpenes - rabdocoetsins A, B and C - isolated from leaves of Chinese plant and characterised (*Zhiwu Xuebao* 1990, *32,* 292; *Chem. Abstr.* 1991, *114,* 98145 w; *Phytochemistry* 1993, *34,* 576); rabdocoetsin D and rosthorin A also isolated (*Zhiwu Xuebao* 1990, *32,* 292; *Chem. Abstr.* 1991, *114,* 98145 w); leaves afforded 4-epihenryine A and rabdocoetsin B (*Yunnan Zhiwu Yanjiu* 1991, *13,* 455; *Chem. Abstr.* 1992, *117,* 86674 s).

NEW COMPOUNDS



Rabdocoetsin A
R,R" = H, R' = OH
Rabdocoetsin B
R = Ac, R' = H, R" = OH
Rabdocoetsin D
R,R" = H, R' = OAc



Rabdocoetsin C

P. menthoides Benth.; see *P. japonicus* (Burm.f.) Koidz. var. *japonicus*

P. mollis (Ait.) Spreng. syn. *P. incanus* Link (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 579).

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Piperitenone oxide (45.01) and cis-piperitone oxide (35.70%) determined in essential oil of plant grown in north-west Himalayan region (*J. Essent. Oil Res.* 1992, *4*, 47; *Chem. Abstr.* 1993, *118*, 187836 x).

P. rugosus Wall. ex Benth. syn. *Rabdosia rugosa* (Wall. ex Benth.) Hara

Kash. - Solei; P. - Chhichhri, Bui, Piumar; Kumaon - Kurkha.

Detection of car-3-ene and phenylethanol as major components in oil by GC-MS (*Gaodeng Xuexiao Huaxue Xuebao* 1990, *11*, 208; *Chem. Abstr.* 1991, *114*, 20977 z); three diterpenoids - rugosanin, isodocarpin and carpalasionin - with respective dihydroderivatives isolated from plant collected from Tibet (*Gaodeng Xuexiao Huaxue Xuebao* 1990, *11*, 1222; *Chem. Abstr.* 1991, *114*, 244246 y).

Distribution: Himalayas, from Kashmir to Garhwal, Bhutan and Mt. Abu in Rajasthan and hills of Madhya Pradesh, alt 900-3000 m.

P. zeylanicus Benth.; see *Coleus zeylanicus* (Benth.) Cramer

PLEIOSPERMIUM (Rutaceae)

P. alatum (Wall. ex Wt. & Arn.) Swingle; see *Naringi alata* (Wall. ex Wt. & Arn.) Ellis

PLEOPELTIS (Polypodiaceae)

P. parishii Bedd.; see *Drynaria propinqua* (Wall. ex Mett.) J.Sm.

PLEUROSPERMUM (Apiaceae)

P. brunonis (DC.) Clarke syn. *P. densiflorum* (Lindl.) Benth. ex Clarke

A new ester isolated from aerial parts of Himalayan herb and characterised as octacosanyl hexadecanoate; in addition, psoralen, bergapten and β-sitosterol isolated (*Phytochemistry* 1994, *35*, 1033).

Distribution: Himalayas, from Kashmir to Nepal, alt. 2700-4200 m.

P. densiflorum (Lindl.) Benth. ex Clarke; see *P. brunonis* (DC.) Clarke

PLEUROSTYLIA (Celastraceae)

P. opposita (Wall.) Alston syn. *P. wightii* Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 511).

Three new hydroxylated spermidine alkaloids - 7-hydroxypleurostyline, 7-hydroxycelacinnine and 7'-hydroxy-7',8'-dihydropleurostyline - isolated from leaves and

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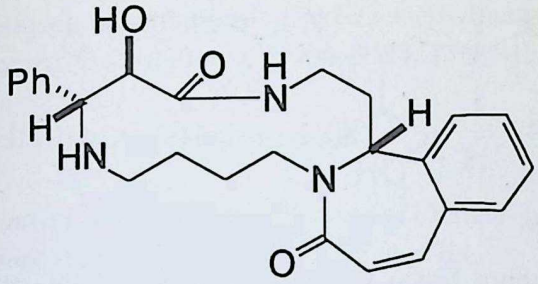
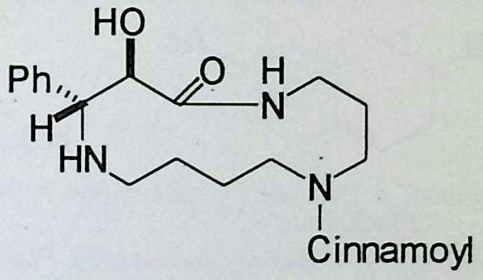
characterised; in addition, pleurostyline, celacinnine and celallocinine isolated (*Helv. Chim. Acta* 1992, *75*, 2283); another new spermidine alkaloid - 7-hydroxypleurocorine - isolated from leaves and its structure elucidated (*Heterocycles* 1994, *38*, 181).

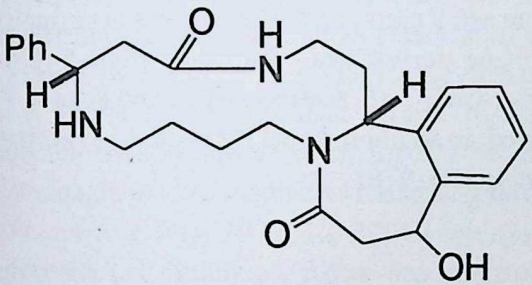
NEW COMPOUNDS



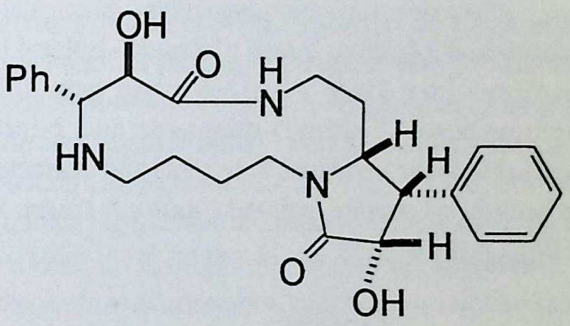
7-Hydroxypleurostyline



7-Hydroxycelacinnine



7'-Hydroxy-7,8'-dihydropleurostyline



7-Hydroxypleurocorine

P. wightii Wt. & Arn.; see *P. opposita* (Wall.) Alston

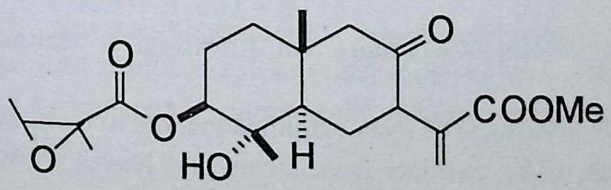
PLUCHEA (Asteraceae)

P. arguta Boiss.

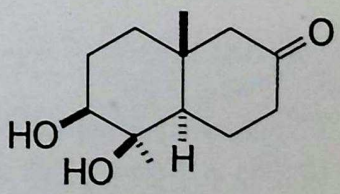
Two new sesquiterpenes - pluchecinin and 11,12,13-trinor-3,4-diepicuauhtemone - isolated from whole plant and characterised (*Phytochemistry* 1989, *28*, 3081); two new terpenoids - pluchidione and pluchidinol - from whole plant and their structure elucidation (*Z. Naturforsch.* 1990, *45*B, 385; *Chem. Abstr.* 1990, *113*, 94750 w).

Distribution: Punjab.

NEW COMPOUNDS



Pluchecinin



11,12,13-Trinor-3,4-di-epicuauhtemone

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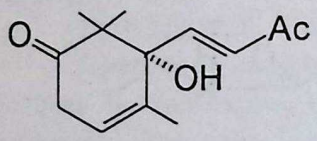
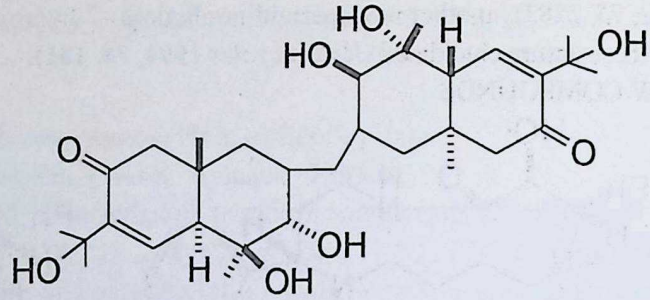


Pluchidione

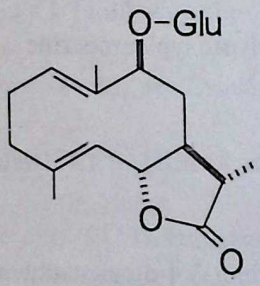


Pluchidinol

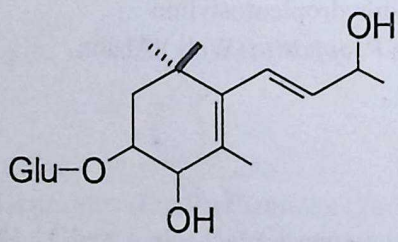
P. indica Less. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 197).

Five new terpenic glycosides - plucheosides A and B, linalyl glucoside, linalylapiosyl glucoside and 9-hydroxylinalyl glucoside - isolated from aerial parts and their structures determined (*Phytochemistry* 1989, *28,* 3369); two new thiophene derivatives - 2-(prop-1-inyl)-5-(5,6-dihydroxyhexa-1,3-diinyl)-thiophene and 2-(prop-1-inyl)-5-(6-acetoxy-5-hydroxyhexa-1,3-diinyl)-thiophene - isolated from roots and characterised; in addition, hop-17(21)-en-3β-yl acetate and boehmeryl acetate isolated (*Indian J. Chem.* 1994, *33*B, 978).

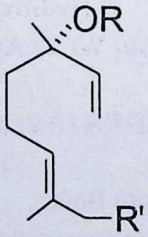
NEW COMPOUNDS



Plucheoside A



Plucheoside B



Linalylapiosyl glucoside
R = Glu(6→1)Apiose, R' = H
Linalyl glucoside
R = Glu, R' = H
9-Hydroxylinalyl glucoside
R = Glu, R' = OH

P. lanceolata (DC.) Clarke (*Compend. Indian Med. Plants,* Vol. 1, Rastogi, & Mehrotra, PID, New Delhi, 1990, p. 320).

Petroleum ether and chloroform extracts of roots exhibited marked anti-inflammatory activity (*Indian J. Chem.* 1990, *29*B, 918); extracts from stems and leaves showed anti-inflammatory activity (*Fitoterapia* 1991, *62,* 441).

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Roots afforded sorghumol, its acetate and boehmeryl acetate (*Indian J. Chem.* 1990, *29*B, 918); isolation of moretenol, its acetate and neolupenol from stems and leaves (*Fitoterapia* 1991, *62,* 441); flowers also afforded moretenol, its acetate, neolupenol and cycloart-23-ene-3β,25-diol (*Indian J. Pharm. Sci.* 1992, *54,* 51); two new aliphatic hydrocarbons - 23-methyldotriacontan-3-one and 22-methylhentriacontane-3,19-dione - isolated from leaves and characterised (*Indian J. Chem.* 1994, *33*B, 812).

PLUMBAGO (Plumbaginaceae)

P. auriculata Lamk. syn. *P. capensis* Thunb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 579).

BIOLOGICAL ACTIVITY

Plumbagin produced a triphasic inotropic response in guinea pig papillary muscle which was unaffected by reserpine or propranolol treatment. It did not produce positive inotropic effects under anoxic conditions or in presence of mitochondrial oxidative phosphorylation inhibitors (*Planta Med.* 1991, *57,* 317); in Ames test using *Salmonella typhimurium,* plumbagin itself did not show any mutagenic effect, but reduced significantly mutagenic effect of 4-nitrophenylenediamine, phenylhydrazine and sodium azide (*Indian J. Med. Res.* 1992, *96,* 143); plumbagin *in vitro* modulated the basal tone of guinea pig trachea and precontracted rabbit trachea (*Pharmacol. Res.* 1993, *27,* 87; *Chem. Abstr.* 1993, *119,* 20250 k); liposomal apigenin-7-O-glucoside (s.c.) inhibited, in dose-dependent manner, skin inflammation caused by xanthine oxidase and cumene hydroperoxide. Results are in good aggreement with superoxide anion radical and peroxyl radical scavenging properties of apigenin *in vitro* (*Arzneim.-Forsch.* 1993, *43,* 370; *Chem. Abstr.* 1993, *118,* 204916 t); α-amyrin, its palmitate and linoleate esters, tested on models of inflammatory and arthritic processes, showed no effect on prostaglandin phase of carrageenin pedal oedema in rats, which was reduced 28.0% by 100 μM indomethacin. They reduced considerably synthesis of 5-lipoxygenase products by human neutrophils (IC50 70 μM) and inhibited rat osteosarcoma cell growth (*Res. Commun. Mol. Pathol. Pharmacol.* 1994, *85,* 45; *Chem. Abstr.* 1994, *121,* 14895 k).

P. capensis Thunb.; see *P. auriculata* Lamk.

P. indica L. syn. *P. rosea* L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 197).

A new naphthoquinone - 5-hydroxyplumbagin - along with plumbagin, sitosterol, stigmasterol and campesterol isolated from aerial parts (*Phytochemistry* 1992, *31,* 3652); isolation of a new dihydroflavonol - plumbaginol - from aerial parts and its characterisation (*Phytochemistry* 1994, *35,* 1083).

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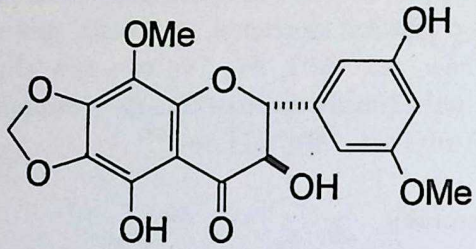
NEW COMPOUNDS



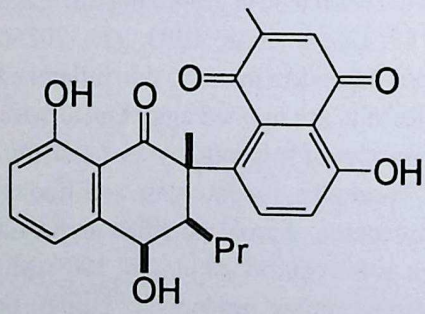
Plumbaginol

P. rosea L.; see *P. indica* L.

P. zeylanica L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 580).

A new binaphthoquinone - chitanone - isolated from aerial parts and its structure determined (*Indian J. Chem.* 1989, *28*B, 984); aerial parts also afforded lupeol, α- and β-amyrins, taraxasterol and ψ-taraxasterol (*J. Indian Chem. Soc.* 1990, *67,* 88).

NEW COMPOUNDS



Chitanone

BIOLOGICAL ACTIVITY

Plumbagin administered to hyperlipidaemic rabbits reduced serum cholesterol by 53.0 to 86.0% and LDL-cholesterol by 61.0 to 91.0%. It lowered cholesterol/phospholipid ratio by 45.8% and elevated decreased HDL-cholesterol significantly. It prevented accumulation of cholesterol and triglycerides in liver and aorta and regressed atheromatons plaques of thoracic and abdominal aorta. Plumbagin-treated hyperlipidaemic subjects excreted more fecal cholesterol and phospholipids (*Indian J. Physiol. Pharmacol.* 1991, *35,* 10).

PLUMERIA (Apocynaceae)

P. rubra L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 548).

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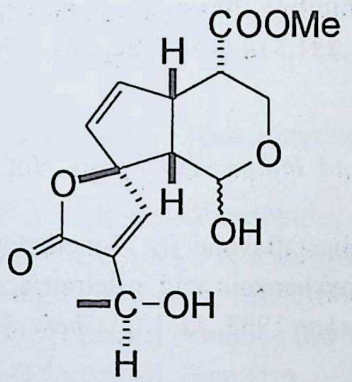
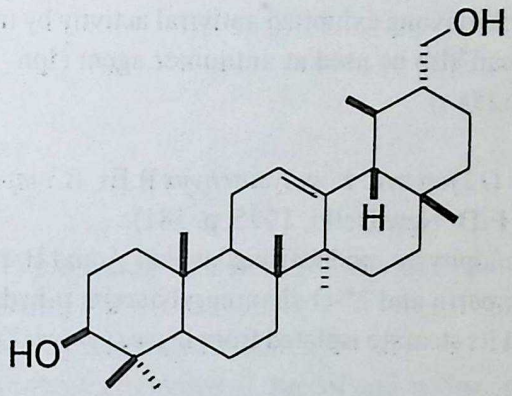
A new lupine alkaloid - plumerinine - isolated from stems and its structure determined (*Heterocycles* 1989, *29,* 1901); Indonesian plant afforded a new compound - 15-demethylplumieride - along with plumieride, α- and β-allamcidins and 13-O-p(E)-coumaroylplumieride; stereostructure of α- and β-allamcidins determined; fulvoplumierin, allamcin, allamandin, 2,5-dimethoxy-p-benzoquinone, plumericin and liriodendrin isolated from bark as cytotoxic compoenents (*J. Nat. Prod.* 1990, *53,* 1447); a new flavanol glycoside - plumerubroside - isolated from stem bark and characterised (*Phytochemistry* 1990, *29,* 2995); two new oleanene triterpenes isolated and characterised as 6α-hydroxy-3-epioleanolic acid and 3α,27-dihydroxyolean-12-ene (*Phytochemistry* 1993, *32,* 1523); another new triterpene - rubrinol - isolated and characterised; taraxasteryl acetate, lupeol, stigmasterol, oleanolic acid and cycloart-22-en-3α,25-diol also isolated (*Fitoterapia* 1994, *65,* 162).

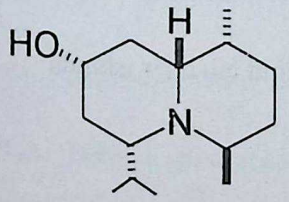
NEW COMPOUNDS



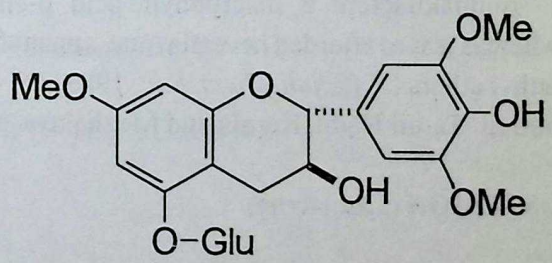
α-Allamcidin
~~ = α
β-Allamcidin
~~ = β



Rubrinol



Plumerinine



Plumerubroside

BIOLOGICAL ACTIVITY

Fulvoplumierin, allamcin, allamandin, 2,5-dimethoxy-p-benzoquinone, plumericin and liriodendrin exhibited cytotoxic activity against a panel of cell lines including murine lymphocytic leukaemia (P-388) and human cancer cell-type viz. colar, breast, fibrosarcoma, lung, melanoma,

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KB etc. (*J. Nat. Prod.* 1990, *53,* 1447); rubrinol exhibited antibacterial activity against *Bacillus anthracis, Pseudomonas aeruginosa, P. pseudomallei* and *Corynebacterium pseudodiphthericum* (*Fitoterapia* 1994, *65,* 162).

PODOCARPUS (Podocarpaceae)

P. latifolia Wall.; see *P. wallichianus* Presl

P. macrophyllus D.Don (*macrophylla*)

A process developed for extraction of hinokiflavone from leaves (Jpn. 1,221,314 (1989) Sep. 04; *Chem. Abstr.* 1990, *113,* 46254 r).

Distribution: Native of China and Japan, introduced into Indian gardens.

BIOLOGICAL ACTIVITY

Hinokiflavone exhibited antiviral activity by inhibiting EB virus genome expression in Raji cells. It can also be used as antitumor agent (Jpn. 1,221,314 (1989) Sep. 04; *Chem. Abstr.* 1990, *113,* 46254 r).

P. neriifolius D.Don syn. *P. polystachyus* R.Br, (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 581).

Sciadopitysin, podocarpusflavones A and B, robustaflavone, its 7"-methylether, 2"-O-rhamnosylscoparin and 2"-O-rhamnosylvitexin, p-hydroxybenzoic acid, n-tetratriacontanol, β-sitosterol and its stearate isolated from leaves (*Zhiwu Xuebao* 1993, *35,* 138; *Chem. Abstr.* 1994, *120,* 4642 e).

P. polystachyus R.Br.; see *P. neriifolius* D.Don

P. wallichianus Presl syn. *P. latifolia* Wall. (*latifolius*)

Tam. - Narambali; Kan. - Kurunthumbi, Khasi - Soplong; Lushai - Thingramao.

Inumakilactone B, macrophylic acid, β-sitosterol and its glucoside isolated from stem wood whereas leaves afforded heveaflavone, amentoflavone and its 7",4'"-dimethyl and 7,4',7",4'"-tetramethyl ethers (*J. Indian Chem. Soc.* 1989, *66,* 423).

Distribution: Tamil Nadu, Kerala and Meghalaya, alt. 900-1500 m and Nicobar islands.

POGOSTEMON (Lamiaceae)

P. auricularius (L.) Hassk. syn. *Dysophylla auricularia* (L.) Blume (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 582).

Two spasmolytic diterpenes (I & II) isolated from aerial parts and characterised as 7(3-methylbutyroxy)cleistanth-13,15-dien-18-oic acid and 7-senecioxycleistanth-13,15-dien-18-oic acid (*Indian J. Chem.* 1990, *29*B, 184); (–)auricularic acid synthesised and absolute configuration

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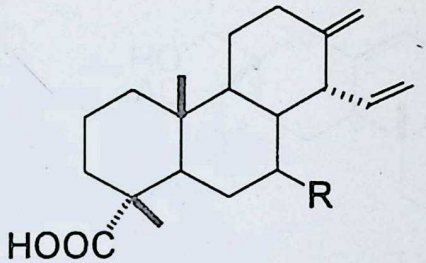
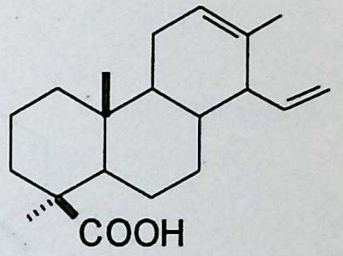
of natural auricularic acid established as (4R,5S,8S,9R,10S,14S) (*Tetrahedron* 1991, *47,* 3829); isolation of a new cleistanthane diterpenoid (III) and its characterisation as (4R,5S,8R,9S,10S,14R)-cleistanth-12,15-dien-19-oic acid by X-ray analysis; stereochemistry at C4 of auricularic acid and of its 7-hydroxy, 7-acetoxy, 7-senecioyloxy and 7-(3-methylbutyryloxy) derivatives revised (*Nat. Prod. Lett.* 1993, *3,* 71; *Chem. Abstr.* 1994, *120,* 270875 w).

NEW COMPOUNDS





Auricularic acid
R = H
I
R = β-2-Me Butyryloxy
II
R = β-Senecioyloxy

III

P. benghalense (Burm.f.) O.Kuntze syn. *P. plectranthoides* Desf. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 551).

Flower extract exhibited low toxicity and sedative activity.

n-Octacosanol, β-amyrin, β-sitosterol, stigmasterol, lupeol and epifriedelinol isolated from flowers (*Herba Pol.* 1989, *35,* 39; *Chem. Abstr.* 1991, *115,* 35565 h).

P. heyneanus Benth. syn. *P. patchouli* Hook.f. (non Pellet.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 583).

Total synthesis of seychellene (*J. Chem. Soc.* Perkin 1 1990, 2109; *ibid.* 1993, 2813).

P. patchouli Hook.f. (non Pellet.); see *P. heyneanus* Benth.

P. plectranthoides Desf.; see *P. benghalense* (Burm.f.) O.Kuntze

POLANISIA (Capparaceae)

P. dodecandra DC.; see *Cleome burmanii* Wt. & Arn.

POLEMONIUM (Polemoniaceae)

P. coeruleum L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 516).

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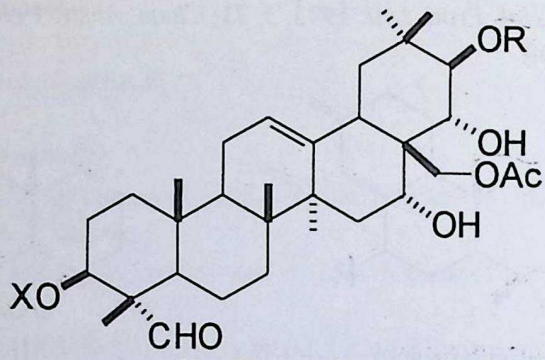
Three new triterpene saponins - polemonium saponin 1, polemonium saponin 2 and polemonium saponin 3 - isolated and characterised (*Pharmazie* 1994, *49*, 58; *Chem. Abstr.* 1994, *120*, 265820 v).

NEW COMPOUNDS



X = Gluc.acid[(2→1)Gal](3→1)Ara
Polemonium saponin 1
R = 2-Me Butyryl
Polemonium saponin 2
R = Angeloyl
Polemonium saponin 3
R = Tigloyl

POLYALTHIA (Annonaceae)

P. longifolia (Sonn.) Thw. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 584).

Two new azafluorene alkaloids - polyfothine and iso-oncodine - along with noroliveroline, oliveroline-β-N-oxide, darienine and the cytotoxic aporphine alkaloid; liriodenine, isolated from stem and stem bark (*J. Nat. Prod.* 1990, *53*, 1327); another new alkaloid - 6,7-dimethoxyonychine - from bark and its characterisation; tetrahydroprotoberberine, (–)stepholidine, onychine and darienine also isolated (*Indian J. Chem.* 1990, *29*B, 394); a new clerodane diterpene - polyalthialdoic acid - isolated from stem bark and its structure determined; in addition, kolavenic acid and 16α-hydroxycleroda-3,13(Z)-dien-15,16-olide isolated (*Planta Med.* 1991, *57*, 380); isolation of a new γ-methoxybutenolide clerodane diterpenoid (I) from stem bark and its structure elucidation (*J. Nat. Prod.* 1992, *55*, 256).

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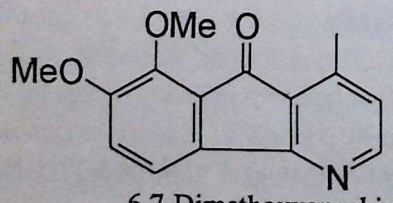
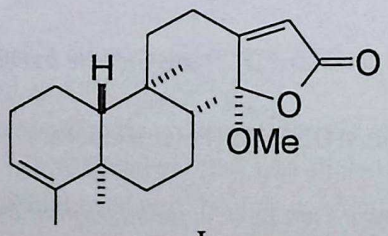


6,7-Dimethoxyonychine



I

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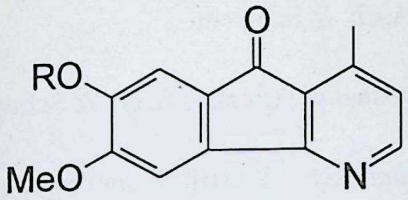
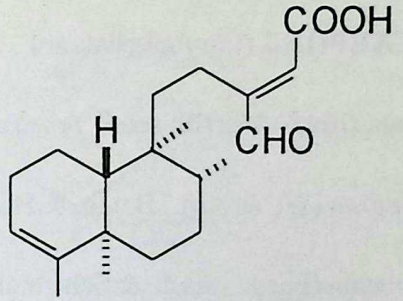


Iso-oncodine
R = H
Polyfothine
R = Me



Polyalthialdoic acid

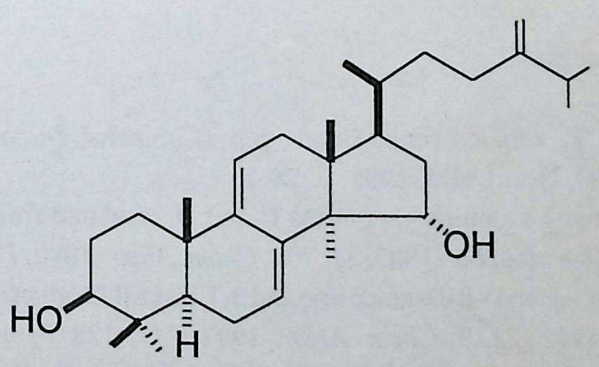
BIOLOGICAL ACTIVITY

Polyalthialdoic acid, kolavenic acid and 16α-hydroxycleroda-3,13(Z)-dien-15,16-olide showed significant activity in brine shrimp bioassay, strongly inhibited growth of crown gall tumors on potato disk and were cytotoxic to three human cell lines. Polyalthialdoic acid was the most active in human tumor cell culture systems (*Planta Med.* 1991, *57,* 380).

P. suberosa Thw. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 585).

Stem bark afforded oxostephanine, lanuginosine, liriodenine, 3,10,11-trihydroxy-1,2-methylenedioxynoraporphine and asimilobine (*J. Bangladesh Acad. Sci.* 1992, *16,* 99; *Chem. Abstr.* 1992, *117,* 188224 n); a lanostane-type triterpene - suberosol - isolated and its structure established (*J. Nat. Prod.* 1993, *56,* 1130).

NEW COMPOUNDS



Suberosol

BIOLOGICAL ACTIVITY

Suberosol exhibited anti-HIV replication activity in H9 lymphocyte cells with EC50 3.0 μg/ml (*J. Nat. Prod.* 1993, *56,* 1130).

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POLYCARPONE (Caryophyllaceae)

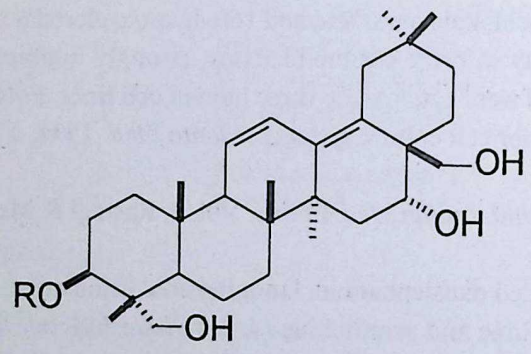
P. indicum (Retz.) Merrill; see *P. prostratum* (Forsk.) Asch. & Schweinf.

P. loeflingiae (Wt. & Arn.) Benth. & Hook.f.; see *P. prostratum* (Forsk.) Asch. & Schweinf.

P. prostratum (Forsk.) Asch. & Schweinf. syn. *P. indicum* (Retz.) Merrill, *P. loeflingiae* (Wt. & Arn.) Benth. & Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 586).

A new triterpenoid saponin - polycarponoside A - isolated from aerial parts and its structure established (*Phytochemistry* 1990, *29,* 3889).

NEW COMPOUNDS



Polycarponoside A
R = Glu(4→1)Ara[(2→1)Glu](4→1)Ara

POLYGALA (Polygalaceae)

P. japonica Houtt. syn. *P. sibirica* sensu Benn., p.p. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 586).

Two new oleanane saponins - saponins C and D - isolated from aerial parts and their structures determined (*Zhiwu Xuebao* 1989, *31,* 708; *Chem. Abstr.* 1990, *113,* 74789 n); astragalin, kaempferol, its 3-O-(6"-O-acetyl)-β-D-glucoside and 3,7-di-O-β-D-glucoside isolated from leaves (*Saengyak Hakhoechi* 1992, *23,* 9; *Chem. Abstr.* 1992, *117,* 128161 e); a new monoacylated flavonol glycoside isolated from leaves and characterised as kaempferol-3-O-[6"-O-(3-hydroxy-3-methylglutaroyl)glucoside] (*Phytochemistry* 1993, *34,* 1196).

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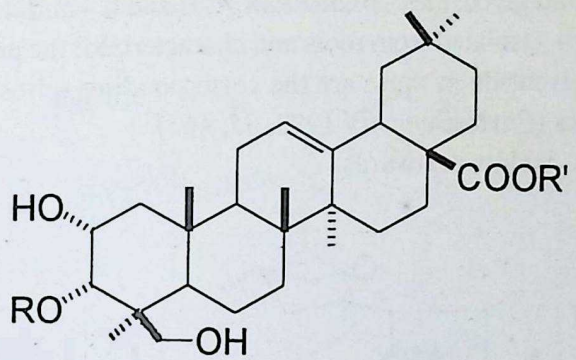


Saponin C
R = Glu(2→1)Glu, R' = H
Saponin D
R = H, R' = Glu(2→1)Glu

P. sibirica Benn.; see *P. japonica* Houtt.

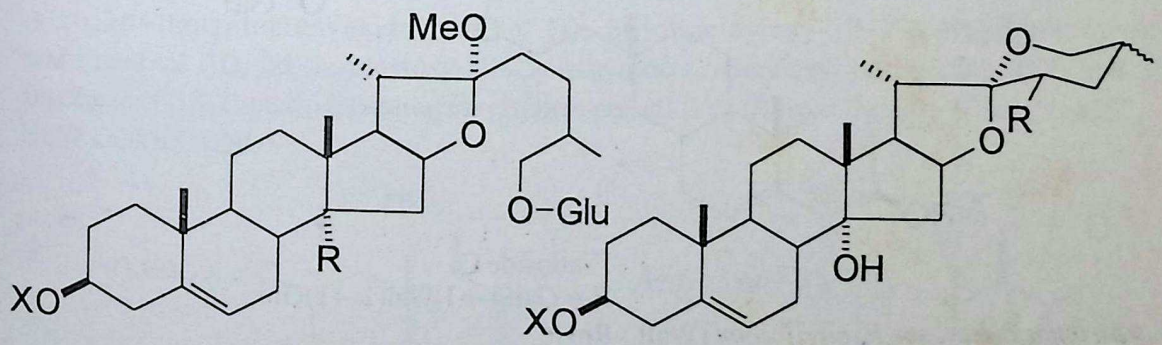
POLYGONATUM (Liliaceae)

P. cirrifolium (Wall.) Royle syn. *P. sibiricum* Baker

Two new steroidal saponins - sibiricoside A (PS-I) and sibiricoside B (PS-IV) - isolated from rhizomes in addition to neoprazerigenin A-3-O-β-lycotetraoside (PS-III) and its methyl proto-type congener (PS-II); new compounds characterised (*J. Nat. Prod.* 1990, *53*, 333).

Distribution: Himalayas, from Himachal Pradesh to Bhutan, alt. 1500-3300 m and north-eastern India, alt. 1200 m.

NEW COMPOUNDS



X = Gal(4→1)Glu[(2→1)Glu](3→1)Xyl

Sibiricoside A
R = H
PS-II
R = OH

Neoprazerigenin A-3-O-β-lycotetraoside
~~ = ax., R = H
Sibiricoside B
~~ = eq., R = OH

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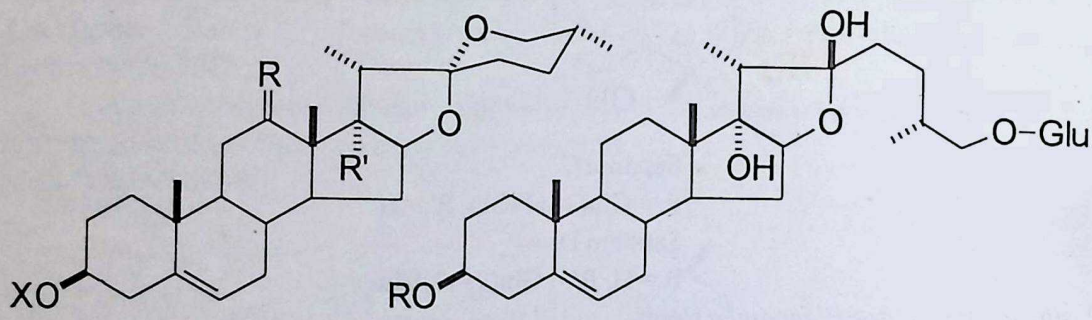
P. prattii Baker

Three new steroid glycosides - pratiosides A, B and C - and three new prosapogenins - pratiosides D1, E1 and F1 - isolated from roots and characterised; the prosapogenins obtained by enzymic hydrolysis of glycoside mixture are the corresponding spirostanol glycosides of their proto-type furostanolones (*Phytochemistry* 1993, *33,* 465).

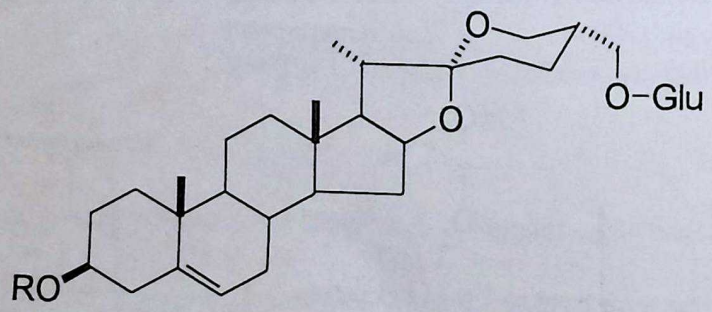
Distribution: Himalayas, Sikkim eastwards.

NEW COMPOUNDS



X = Gal(4→1)Glu(2→1)Glu
Pratioside A
R = H,H, R' = OH
Pratioside D1
R = O, R' = H
Pratioside E1
R = β-OH,α-H, R' = H
Pratoside F1
R = β-OH,α-H, R' = OH

Pratioside B
R = Gal(4→1)Glu(2→1)Glu



Pratioside C
R = Gal(4→1)Glu(2→1)Glu

P. sibiricum Baker; see *P. cirrifolium* (Wall.) Royle

POLYGONUM (Polygonaceae)

P. aviculare L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 587).

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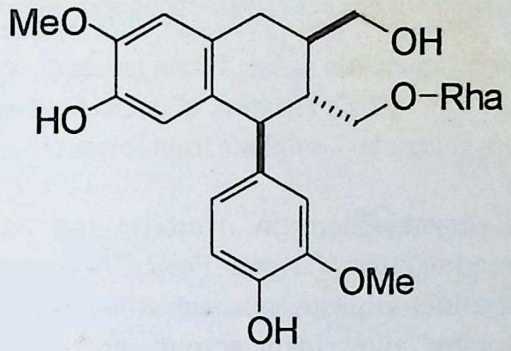
A new lignan glycoside - aviculin - isolated and its structure determined; in addition, juglanin, avicularin, astragalin and betmidin isolated (*J. Nat. Prod.* 1994, *57,* 581).
NEW COMPOUNDS



Aviculin

P. bistorta Garcke; see *P. viviparum* L.

P. chinense L.; see *P. chinense* L. var. *brachiatum* (Lamk.) Meissn.

P. chinense L. var. *brachiatum* (Lamk.) Meissn. syn. *P. chinensis* sensu Hook.f. (non L.), p.p. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 554).

Batatifolin isolated (*Pharmazie* 1990, *45,* 225; *Chem. Abstr.* 1990, *113,* 20885 x).

P. flaccidum Meissn.; see *P. hydropiper* L. var. *flaccidum* (Meissn.) Steward

P. glabrum Willd. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 519).

Four new diesters of 2,3-dihydroxyisodrimeninols isolated from leaves and characterised as 2α,2β-diangeloyloxyisodrimeninol (I), 2α-angeloyloxy-3β-2'-methylbutanoyloxy-isodrimeninol (II), 2α-angeloyloxy-3β-2'-methylpent-2'-enoyloxyisodrimeninol (III) and 2α-angeloyloxy-3β-2'-methylpentanoyloxyisodrimeninol (IV) (*Phytochemistry* 1992, *31,* 4207).
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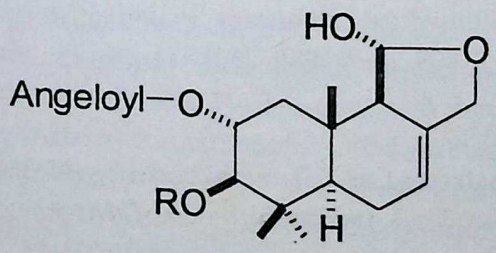

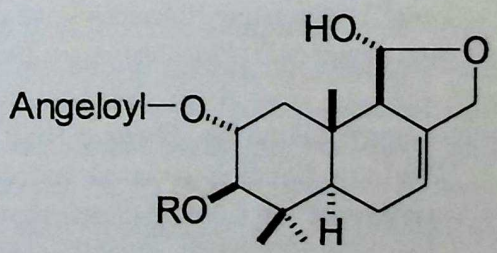

I
R = COC(Me)=CHMe
II
R = COCH(Me)Et

III
R = COC(Me)=CHEt
IV
R = COCH(Me)Pr

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P. hydropiper L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 587).

Synthesis of (+)polygodial (*Chinese Sci. Bull.* 1989, *34,* 1615; *Chem. Abstr.* 1991, *114,* 43199 m; *Tetrahedron Lett.* 1994, *35,* 3781); enantioselective total synthesis of (–) warburganal (*Ann. Chem.* 1989, 695; *Tetrahedron Lett.* 1994, *35,* 3781); quercetin, isoquercitrin, 7,4'-dimethylquercetin and 3'-methylquercetin isolated from leaves (*J. Agric Food Chem.* 1992, *40,* 1349; *Chem. Abstr.* 1992, *117,* 88998 z); isolation of quercetin-3-sulphate, isorhamnetin-3,7-disulphate and tamarixetin-3-glucosido-7-sulphate from leaves (*Phytochemistry* 1994, *35,* 885).

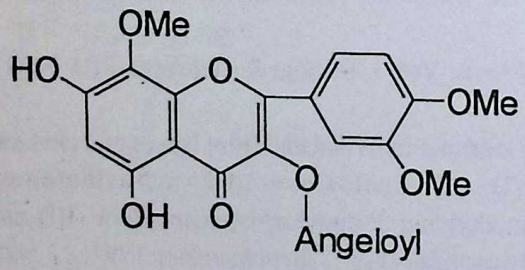
BIOLOGICAL ACTIVITY

Isoquercitrin, 7,4'-dimethylquercetin, quercetin and 3'-methylquercetin exhibited antioxidant activity in decreasing order (*J. Agric. Food. Chem.* 1992, *40,* 1349; *Chem. Abstr.* 1992, *117,* 88998 z); quercetin-3-sulphate, isorhamnetin-3,7-disulphate and tamarixetin-3-glucosido-7-sulphate exhibited antioxidant activity greater than that of α-tocopherol (*Phytochemistry* 1994, *35,* 885); antitumor-promoting activity of warburganal and polygodial was observed *in vitro* (Epstein-Barr virus activation in Raji cells) and in mice with DMBA-induced papillomas (*Basic Life Sci.* 1990, *52,* 423; *Chem. Abstr.* 1990, *113,* 184331 q).

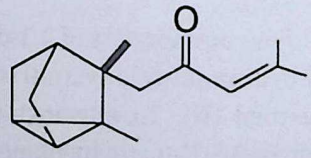
P. hydropiper L. var. *flaccidum* (Meissn.) Steward syn. *P. flaccidum* Meissn. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 200).

A new acylflavone - flaccidine - and a new α-santalene derivative - α-santalone - isolated and their structures elucidated (*Phytochemistry* 1991, *30,* 3155).

NEW COMPOUNDS



Flaccidine



α-Santalone

Note: Trivial name 'flaccidin' given to a dihydrophenanthropyran derivative isolated from *Coelogyne flaccida* (*Phytochemistry* 1988, *27,* 899; *ibid.* 1989, *28,* 887).

P. kawagoeanum Makino syn. *P. minus* Huds.

Two new flavones isolated and characterised as 6,7-methylenedioxy-5,3',4',5'-tetramethoxyflavone and 6,7:4',5'-dimethylenedioxy-3,5,3'-trimethoxyflavone (*Phytochemistry* 1990, *29,* 3687).

Distribution: Kashmir.

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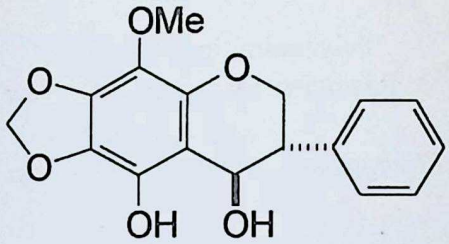
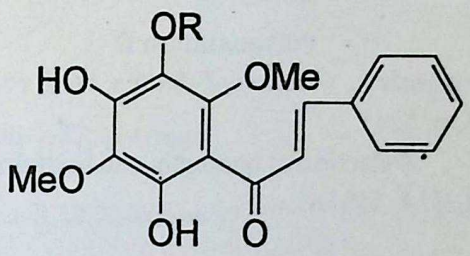
P. lapathifolium L. var. *lapathifolium* (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 588).

Isolation of a new isoflavanone - lapathinol -, a dihydrochalcone - lapathone - and three chalcones - angelafolone, valafolone and melafolone - and their characterisation (*Phytochemistry* 1990, *29,* 2009).

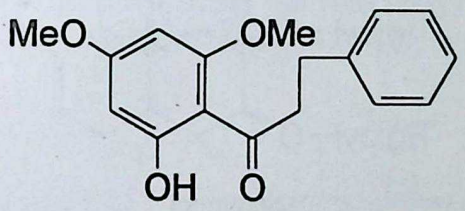
NEW COMPOUNDS



Lapathinol



Angelafolone
R = Angeloyl
Valafolone
R = Isovaleryl
Melafolone
R = 2-Me Butyryl



Lapathone

P. minus Huds.; see *P. kawagoeanum* Makino

P. multiflorum Thunb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 588).

Isolation of emodin, its 2-acetyl, 8-O-glucoside and 1,6-dimethyl ether derivatives, questin, questinol, citreorosein, physcion and its 8-O-glucoside, 2-methoxy-6-acetyl-7-methyljuglone, tricin, N-trans-feruloyl-3-methyltyramine, N-trans-feruloyl-3-methyldopamine, 2,3,5,4'-tetrahydroxystilbene-2-O-β-D-glucoside, daucosterol and gallic acid from root tubers (*Zhongcaoyao* 1993, *24,* 115; *Chem. Abstr.* 1993, *119,* 91252 y); two new compounds - polygonimitins B and C - isolated from roots and their structures determined (*Yaoxue Xuebao* 1994, *29,* 107; *Chem. Abstr.* 1994, *121,* 104075 m).

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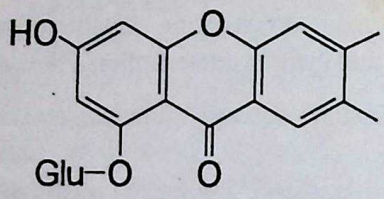
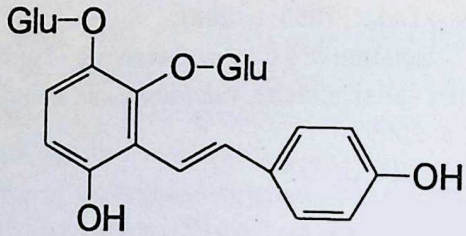
NEW COMPOUNDS



Polygonimitin B



Polygonimitin C

P. orientale L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 521).

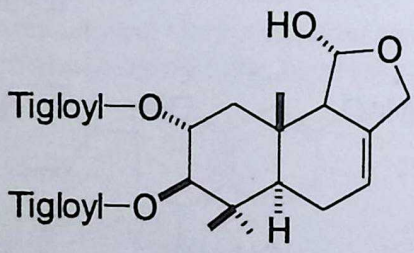
Detection of quercetin and taxifolin in fruits (*Zhongcaoyao* 1990, *21,* 343; *Chem. Abstr.* 1991, *114,* 3481 r).

P. stagninum Buch.-Ham. ex Meissn. syn. *Persicaria stagnina* (Buch.-Ham. ex Meissn.) Hara

A new sesquiterpene - stagninol - isolated and its structure established (*Planta Med.* 1991, *57,* 503).

Distribution: Throughout India, in plains.

NEW COMPOUNDS



Stagninol

P. viviparum L. syn. *P. bistorta* Garcke (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 587).

Alcoholic extract of plant showed dose-dependent inhibition of carrageenin-induced rat paw oedema in dose range 100.0-400.0 mg/kg, ED50 being 158.5 mg/kg. At 200.0 mg/kg, administered before induction of adjuvant arthritis, it significantly inhibited both acute and chronic phases of adjuvant-induced oedema in rat (*J. Pharm. Pharmacol.* 1994, *46,* 286).

POLYPODIUM (Polypodiaceae)

P. niponicum Mett.

A new migrated dammarane hydrocarbon - aonena-3, 21-diene - and two malabaricane hydrocarbons - podioda-7,17,21-triene and podioda-8,17,21-triene - isolated from fresh rhizomes and their structures elucidated (*Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1989, 31st, 554; *Chem. Abstr.* 1990, *112,* 195194 c).

Distribution: Meghalaya.

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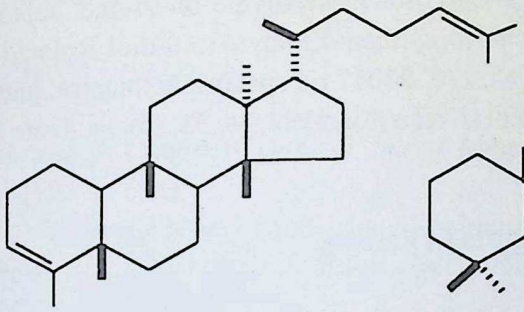
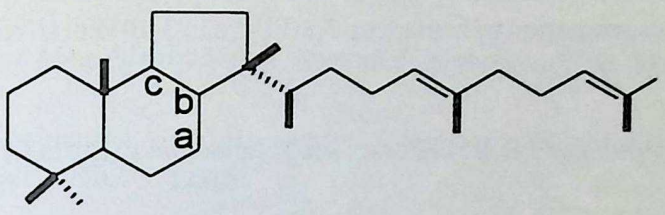
NEW COMPOUNDS



Aonena-3,21-diene

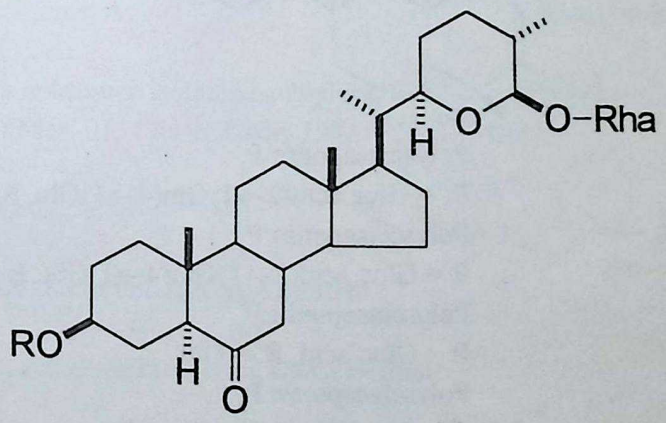


Podioda-7,17,21-triene
ab = Δ
Podioda-8,17,21-triene
bc = Δ

P. vulgare L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 590).

Three new triterpenoids - dammara-17,21-diene, cyclopodomenyl acetate and 21αH,22-hydroxyhopane - isolated from fresh rhizomes of Japanese plant and their structures established; in addition, hop-22(29)-ene, neohop-13(18)-ene, fern-9(11)-ene, serrat-14-ene, cycloartanyl acetate, 31-norcycloartanyl acetate and cyclolaudenyl acetate isolated (*Phytochemistry* 1991, *30,* 3369); structure revision of osladin by X-ray analysis (*Tetrahedron Lett.* 1992, *33,* 4009); synthesis of osladin (*Synlett* 1993, 54; *Chem. Abstr.* 1993, *119,* 9055 e).

NEW COMPOUNDS



Osladin
R = Glu(2→1)Rha

POLYSCIAS (Araliaceae)

P. fruticosa (L.) Harms syn. *Nothopanax fruticosus* Miq., *Panax fruticosus* L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 201).

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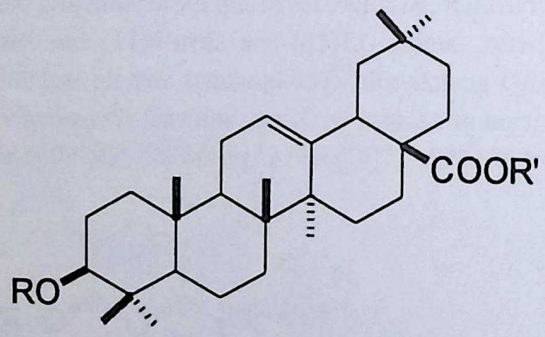
Roots contained saponins (0.49%) (*Tap Chi Duoc Hoc* 1991, 19; *Chem. Abstr.* 1992, *116,* 46103 c); falcarinol, panaxydol, heptadeca-1,8(E)-dien-4,6-diyn-3-ol-10-one, heptadeca-1,8(Z)-dien-4,6-diyn-3-ol-10-one and heptadeca-1,8(Z)-dien-4,6-diyn-3,10-diol isolated from roots (*Herba Pol.* 1992, *38,* 3; *Chem. Abstr.* 1993, *118,* 98017 p); spectrophotometric and TLC determination of heptadeca-1,8(E)-diene-3,10-diol (*Herba Pol.* 1992, *38,* 53; *Chem. Abstr.* 1993, *119,* 91166 y).

P. pinnata J.R. & G.Forst.; see *P. scutellaria* (Burm.f.) Fosberg

P. scutellaria (Burm.f.) Fosberg syn. *P. pinnata* J.R. & G. Forst. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 590).

Two new oleanolic glycosides - polysciasaponins P_2 and P_5 isolated from leaves and their structures established (*J. Nat. Prod.* 1989, *52,* 239); a new saponin - polysciasaponin P_1 - isolated and characterised (*J. Nat. Prod.* 1990, *53,* 163); another saponin - polysciasaponin P_3 - from leaves and found to be identical to Chikusetsusaponin V (*Pharmazie* 1989, *44,* 580; *Chem. Abstr.* 1990, *112,* 52249 p; *J. Nat. Prod.* 1990, *53,* 163).

NEW COMPOUNDS



Polysciasaponin P_1
R, = Gluc.acid(2→1)Glu(4→1)Glu, R' = Glu
Polysciasaponin P_2
R = Gluc.acid(2→1)Glu(4→1)Glu, R' = H
Polysciasaponin P_3
R = Gluc.acid, R' = Glu
Polysciasaponin P_4
Gluc.acid(3→1)Glu, R' = Glu
Polysciasaponin P_5
R = Gluc.acid(2→1)Glu, R' = H
Polysciasaponin P_6
R = Gluc.acid(3→1)Glu, R' = H
Polysciasaponin P_7
R = Gluc.acid, R' = H

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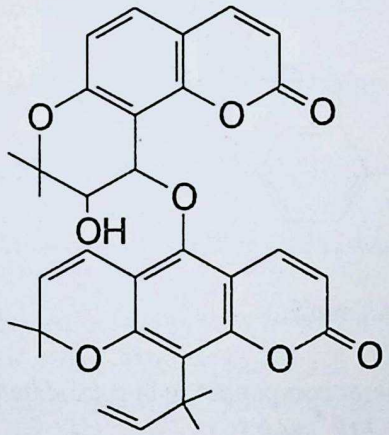
Note : Saponins A, B and C, reported earlier by same authors (*Phytochemistry* 1989, *28*, 1539) are identical to polysciasaponins P_7, P_6 and P_4 respectively.

PONCIRUS (Rutaceae)

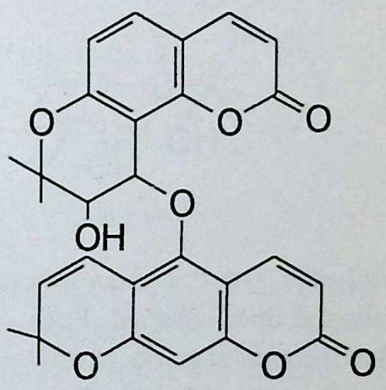
P. trifoliata (L.) Rafin. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 591).

Two new binary coumarins - khelmarins A and B - isolated from root bark and their structures established (*Chem. Pharm. Bull.* 1990, *38,* 1230).

NEW COMPOUNDS



Khelmarin A



Khelmarin B

BIOLOGICAL ACTIVITY

An antitumor substance isolated from plant, IC50 0.1 μg/ml against L1210 cells *in vitro* (Jpn. 6,56,861 (1994) Mar. 01; *Chem. Abstr.* 1994, *121,* 18015 k).

PONGAMIA (Papilionaceae)

P. glabra Vent.; see *Derris indica* (Lamk.) Bennett

P. pinnata (L.) Pierre; see *Derris indica* (Lamk.) Bennett

POPULUS (Salicaceae)

P. balsamifera L.; see *P. laurifolia* Ledeb.

P. deltoides Marsh.

H. - Poplar; Eng. - Caroline poplar.

Pinocembrin, galangin, pinocembrin chalcone, pinobanksin, its 3-methyl ether and 3-

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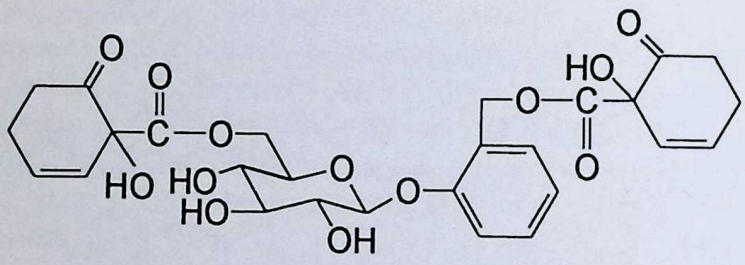
acetate identified in bud exudate (*Z. Naturforsch.* 1990, *45*C, 587; *Chem. Abstr.* 1990, *113,* 148938 j; *Phytochemistry* 1992, *31,* 1255); pinostrobin, pinocembrin, alpinone, chrysin, tectochrysin, apigenin, galangin, kaempferol, quercetin and isorhamnetin isolated from buds of plant collected in March (*Khim. Prir. Soedin.* 1990, 548; *Chem. Abstr.* 1991, *114,* 118511 t); α-bisabolol (26.0) and ar-curcumene (17.0%) determined in leaf oil by GC-MS (*J. Essent. Oil Res.* 1991, *3,* 279; *Chem. Abstr.* 1991, *115,* 275763 q); a new phenolic glycoside (I) isolated from leaves and characterised as salicortin-6'-O-(1-hydroxy-6-oxo-2-cyclohexen-1-carboxylate) (*J. Nat. Prod.* 1994, *57,* 808).

Distribution: Native of North America, introduced into India.

NEW COMPOUNDS



I

P. laurifolia Ledeb. syn. *P. balsamifera* sensu Hook.f. (non.L.)

Lahaul & Spiti - Phalash, Pakh.

Identification of pinobanksin-3-acetate as major component in bud exudate by GC-MS (*Z. Naturforsch.* 1992, *47*C, 776; *Chem. Abstr.* 1993, *118,* 3869 f).

Distribution: Himalayas, Lahaul-Spiti (in Himachal Pradesh), alt. 2400-4000 m.

P. nigra L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 591).

Sugar linkage of (+)isolariciresinol monoglucoside determined as 2α (*Pharmazie* 1989, *44,* 357; *Chem. Abstr.* 1990, *112,* 56463 b); pinobanksin, pinocembrin and 3,7-dimethylquercetin isolated (*Chem. Pharm. Bull.* 1989, *37,* 3128).

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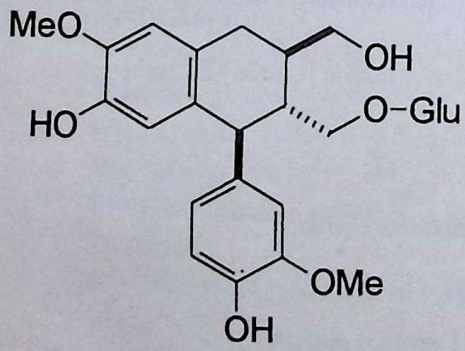

(+)Isolariciresinol-2α-O-glucoside

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BIOLOGICAL ACTIVITY

Pinobanksin, 3,7-dimethylquercetin and pinocembrin inhibited 3-keto-4-en-steroid(5α)reductase, prepared from rat prostate; pinocembrin being the most potent (*Chem. Pharm. Bull.* 1989, *37,* 3128).

P. yunnanensis Dode

Eng. - Yunnan poplar.

A new triterpene isolated from roots, along with friedelin and 21α-hydroxyfriedelan-3-one and its structure elucidated as 21α-acetoxyfriedelan-3-one (*Yaoxue Xuebao* 1990, *25,* 307; *Chem. Abstr.* 1990, *113,* 112504 a); pinocembrin, pinobanksin 3-acetate, caffeic acid and its ester isolated from bud exudate (*Z. Naturforsch.* 1992, *47*C, 477; *Chem. Abstr.* 1992, *117,* 86804 j).

Distribution: Native of south-west China, introduced into India.

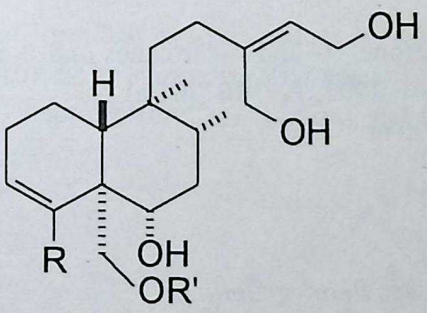
PORTULACA (Portulacaceae)

P. grandiflora Hook.; see *P. pilosa* L. var. *grandiflora* (Hook.) Geesink

P. pilosa L. ssp. *pilosa* syn. *P. tuberosa* Roxb.; *P. suffruticosa* Wall. ex Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 592).

Three trans-clerodane diterpenoids - pilosanols A, B and C - isolated from roots and characterised (*Phytochemistry* 1991, *30,* 4075).

NEW COMPOUNDS



Pilosanol A
R = Me, R' = H
Pilosanol B
R = CH_2OH, R' = H
Pilosanol C
R = Me, R' = Glu

P. pilosa L. var. *grandiflora* (Hook.) Geesink syn. *P. grandiflora* Hook. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 592).

Two new betalamic acid conjugates - portulacaxanthin II and portulacaxanthin III - isolated from flowers and their structures elucidated (*Phytochemistry* 1991, *30,* 1897).

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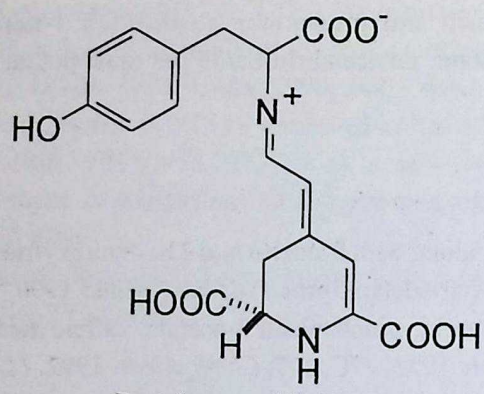
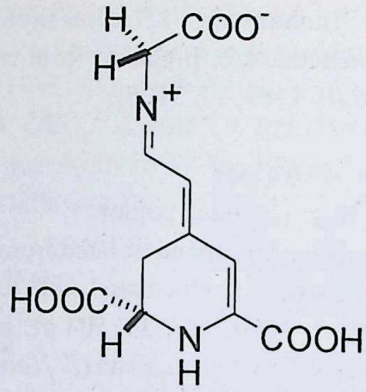


Portulacaxanthin II



Portulacaxanthin III

P. suffruticosa Wall. ex Wt. & Arn.; see *P. pilosa* L. ssp. *pilosa*

P. tuberosa Roxb.; see *P. pilosa* L.ssp. *pilosa*

POTENTILLA (Rosaceae)

P. anserina L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 202).

Isolation of scopoletin and umbelliferone (*Khim. Prir. Soedin.* 1991, 852; *Chem. Abstr.* 1992, *117,* 167701 a).

P. argentea L.

Scopoletin, umbelliferone, α- and β-carotenes and β-sitosterol isolated (*Khim. Prir. Soedin.* 1991, 852; *Chem. Abstr.* 1992, *117,* 167701 a).
Distribution: Kashmir, alt. 2400 m.

PREMNA (Verbenaceae)

P. corymbosa Rottl. & Willd.; see *P. integrifolia* L.

P. corymbosa Rottl. & Willd. var. *obtusifolia* R.Br.; see *P. integrifolia* L.

P. herbacea Roxb.; see *Pygmaeopremna herbacea* (Roxb.) Moldenke

P. integrifolia L. syn. *P. corymbosa* sensu Hook.f. (non Rottl. & Willd.), *P. obtusifolia* R.Br., *P. corymbosa* sensu Hook.f. (non Rottl. & Willd.) var. *obtusifolia* R.Br. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 594).

The isoxazole alkaloid - premnazole - isolated from leaves (*Fitoterapia* 1992, *63,* 295);

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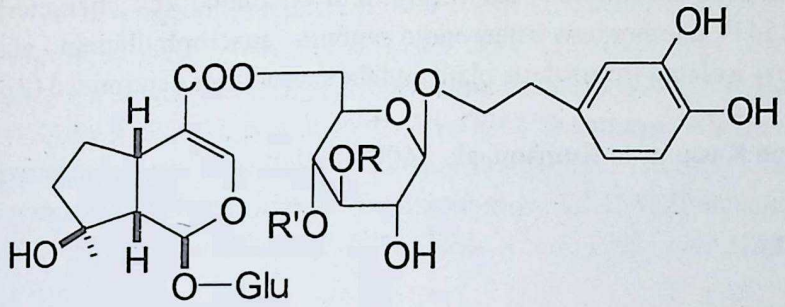
an iridoid glucoside conjugate - premcoryoside - isolated from leaves along with verbascoside (acteoside), 2"-caffeoyl-, 2"-trans- and cis-p-coumaroyl-, 3"-p-coumaroyl esters of 6-O-α-L-rhamnopyranosylcatalpol (*Phytochemistry* 1993, *32,* 983).

NEW COMPOUNDS



Premcoryoside

R = Rha, R' = Caffeoyl

BIOLOGICAL ACTIVITY

Premnazole exhibited anti-inflammatory activity comparable to phenylbutazone in reducing cotton pellet-induced granuloma formation in rats (*Fitoterapia* 1992, *63,* 295).

P. obtusifolia R.Br.; see *P. integrifolia* L.

PRIMULA (Primulaceae)

P. denticulata Smith (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 595).

A new flavone isolated from leaf exudate and its structure established as 5-hydroxy-6,2'-dimethoxyflavone and confirmed by synthesis (*Phytochemistry* 1990, *29,* 633); isolation of two new triterpene glycosides - denticin and denticulatin - and their characterisation (*Planta Med.* 1990, *56,* 94).

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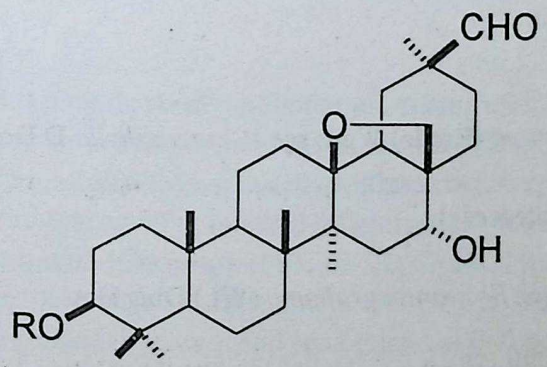

Denticin

R = Ara[(2→1)Glu](4→1)Glu[(2→1)Xyl](4→1)Glu

Denticulatin

R = Ara[(2→1)Glu](4→1)Glu[(2→1)Xyl](4→1)Glu(2→1)Glu

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P. macrophylla D.Don var. *macrophylla* syn. *P. stuartii* Wall. var. *purpurea* (Royle) Watt

A new flavone glucoside - macrophylloside - isolated from whole plant and its structure determined (*Phytochemistry* 1991, *30,* 4206); isolation of a new compound and its characterisation as 3,3'-dihydroxy chalcone; in addition, 3'-methoxyflavone and β-sitosterol isolated (*J. Nat. Prod.* 1992, *55,* 956); a new triterpenoid saponin - macrophyllicin - isolated and characterised (*Phytochemistry* 1993, *32,* 1543); another new triterpenoid saponin - macrophyllicinin - and its aglycone - macrophyllogenin - isolated from whole plant and their structures determined (*J. Nat. Prod.* 1993, *56,* 1580).

Distribution: Himalayas, from Kashmir to Kumaon, alt. 3600-4800 m.

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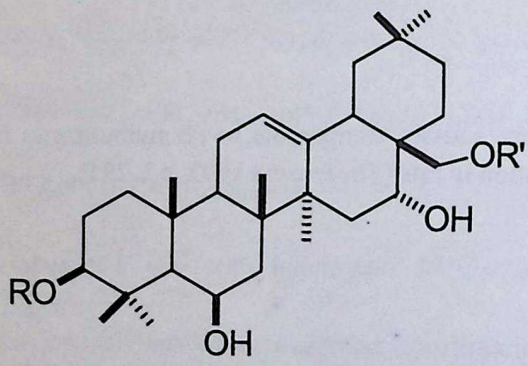

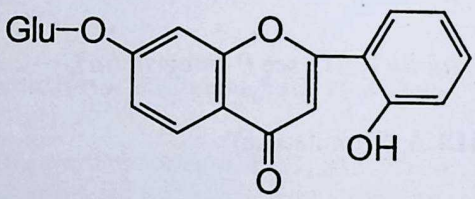

Macrophyllicin
R = Gluc.acid(2→1)Gal(2→1)Glu(2→1)Rha, R' = H
Macrophyllicinin
R = Gluc.acid(2→1)Gal(2→1)Glu(2→1)Rha, R' = Ac
Macrophyllogenin
R = H, R' = Ac

Macrophylloside

P. stuartii Wall. var. *purpurea* (Royle) Watt; see *P. macrophylla* D.Don var. *macrophylla*

PRISTIMERA (Hippocrateaceae)

P. grahamii A.C. Smith; see *Reissantia grahamii* (Wt.) Ding Hou

P. indica (Willd.) A.C. Smith; see *Reissantia indica* (Willd.) Halle

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PROSOPIS (Mimosaceae)

P. chilensis (Molana) Stuntze syn. *P. juliflora* (Swartz) DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 597).

A new alkaloid - N-methyljulifloridine - isolated from leaves and its structure determined (*Sci. Pharm.* 1990, *58,* 409; *Chem. Abstr.* 1991, *114,* 160753 y); identification of caproic, lauric, myristic, palmitic, stearic, oleic, linoleic and linolenic acids as well as glucose (1.3) and sucrose (27.07%) in pods of Egyptian plant by GLC; the unsaponifiable fraction of pods contained campesterol, stigmasterol and β-sitosterol whereas rhamnose, fructose, glucose, galactose, glucuronic and galacturonic acids identified by GLC-TLC in mucilage hydrolysates of pods (*Egypt. J. Pharm. Sci.* 1991, *32,* 283; *Chem. Abstr.* 1992, *117,* 219824 q).

P. juliflora (Swartz) DC.; see *P. chilensis* (Molana) Stuntze

PRUNELLA (BRUNELLA) (Lamiaceae)

P. hispida Benth.; see *P. vulgaris* L.

P. vulgaris L. syn. *Brunella vulgaris* L., *Prunella vulgaris* L. var. *hispida* (Benth.) Hook.f., *P. hispida* Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 598).

Effect of total saponins of acute myocardial infarction and hypertension of anaesthetised rats assessed. At a dose of 20.0 mg/kg, i.p., it significantly reduced infarct size and at 2.5 mg/kg, i.v., it showed hypotensive action in both systolic and diastolic blood pressure (*Zhongcaoyao* 1994, *25,* 302; *Chem. Abstr.* 1994, *121,* 245580 j).

Glucosides of sitosterol, stigmasterol, stigmast-7-enol and spinasterol isolated from stems and leaves and identified by ^{13}C-NMR (*Phytochemistry* 1990, *29,* 2351); betulinic acid and 2α,3α-dihydroxyurs-12-en-28-oic acid isolated (*Arch. Pharmacal Res.* 1992, *15,* 242; *Chem. Abstr.* 1993, *118,* 230194 a).

BIOLOGICAL ACTIVITY

Betulinic acid (5.0 μM) markedly inhibited promoting effect of TPA (2.5 μg) applied twice weekly on skin tumor formation in mice initiated with 7,12-dimethylbenz[a]anthracene (50.0 μg). It also markedly inhibited TPA-induced ornithine decarboxylase in mouse skin. Thus inhibitory effect of betulinic acid on TPA-induced inflammation almost paralleled its inhibitory activity against tumor promotion (*Oncology* 1991, *48,* 72; *Chem. Abstr.* 1992, *116,* 277 j).

Treatment of vero cells with betulinic and 2α,3α-dihydroxyurs-12-en-28-oic acids for 72 hr after challenge with Herpes simplex virus type I caused significant reduction in cytopathic effects. Antiviral activity determined by plaque reduction assay and EC50 found to be 30.0 and 8.0 μg/ml respectively (*Arch. Pharmacal Res.* 1992, *15,* 242; *Chem. Abstr.* 1993, *118,* 230194 a).

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P. vulgaris L. var. *hispida* (Benth.) Hook.f.; see *P. vulgaris L.*

PRUNUS (Rosaceae)

P. amygdalus Batsch.; see *P. dulcis* (Mill.) D.A. Webb

P. armeniaca L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 599).

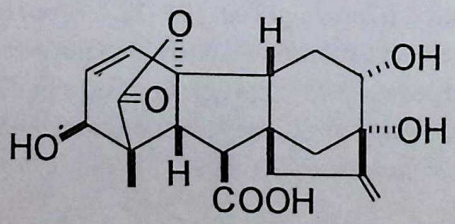
Hexane extract of seeds inhibited mutagenicity of benzo[a]pyrene, 3-amino-1,4-dimethyl-5H-pyrido[4,3-b]indole and 2-(2-furyl)-3-(5-nitro-2-furyl)acrylamide; oleic and linoleic acids identified as inhibitory substances (*Yakugaku Zasshi* 1992, *112,* 934; *Chem. Abstr.* 1993, *118,* 182894 e).

Plant contained HCN (0.004%) (*Sci. Int.* 1990, *2,* 311; *Chem. Abstr.* 1992, *116,* 124847 q); p-cymen-8-ol, butanol, isobutanol, isovaleraldehyde, butyl acetate, hexyl acetate, phenylacetaldehyde, 2,6,6-trimethyl-2-vinyltetrahydropyran, ionene, toluene and butyric, palmitic and linoleic acids identified by GC and GC-MS (*Elelmez. Ip.* 1990, *44,* 51; *Chem. Abstr.* 1990, *113,* 170709 g); linalool, γ-decalactone, hexanal, (E)2-hexenal, (E,E)2,4-decadienal, (E)2-nonenal, γ-dodecalactone and β-ionone identified in fruits by GC-MS (*J. Agric. Food Chem.* 1990, *38,* 471; *Chem. Abstr.* 1990, *112,* 117571 j); dried fruits contained 3,4-dihydroxybenzoic, chlorogenic and vanillic acids; quercetin, quercitrin, rutin, hyperoside and kaempferol identified by HPLC and TLC (*An. Bromatol.* 1992, *44,* 71; *Chem. Abstr.* 1994, *120,* 75974 a); oleic (0.7) and linoleic (0.4%) acids determined in seeds by HPLC (*Yakugaku Zasshi* 1992, *112,* 934; *Chem. Abstr.* 1993, *118,* 182894 e); isolation of lilac alcohol, lilac aldehyde, lilac acetate, 6-hydroxy-2,6-dimethyl-2,7-octadienal and 2(Z),6-dimethyl-2,7-octadien-1,6-diol from flowers (*ACS Symp. Ser.* 1993, 525; *Chem. Abstr.* 1993, *119,* 68113 v); glucose, fructose, citric acid and malic acid identified in fruit pulp (*Fluess. Obst.* 1993, *60,* 178; *Chem. Abstr.* 1993, *119,* 199539 m).

P. avium L. syn. *Cerasus avium* Moench (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 599).

Identification of protocatechuic, p-coumaric, ferulic and diferulic acids in shoots (*Gartenbauwissenschaft* 1990, *55,* 69; *Chem. Abstr.* 1991, *114,* 58846 u); a new polar gibberellin - GA87 - isolated from developing fruitlets and its structure determined and confirmed by synthesis (*Phytochemistry* 1993, *32,* 781).

NEW COMPOUNDS



GA87

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P. cerasoides D.Don syn. *P. puddum* (Roxb. ex Ser.) Roxb. ex Brand. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 600).

A new flavanone glycoside - puddumin B - isolated and its structure elucidated (*Int. J. Crude Drug Res.* 1989, *27,* 223); β-sitosterol, stigmasterol, ursolic acid, prunetinoside, glucogenkwanin and neosakuranin isolated from root bark (*Fitoterapia* 1993, *64,* 473).

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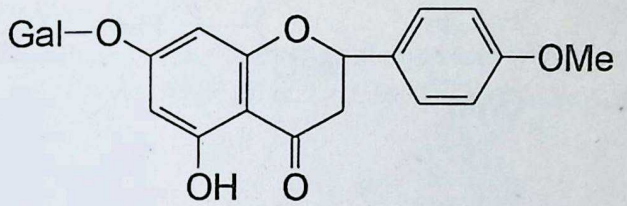

Puddumin B

P. cerasus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 600).

Identification of protocatechuic, p-coumaric, ferulic and diferulic acids in shoots (*Gartenbauwissenschaft* 1990, *55,* 69; *Chem. Abstr.* 1991, *114,* 58846 u); tectochrysin-5-glucoside, genistein-5-glucoside and prunetin-5-glucoside isolated from bark (*Phytochemistry* 1990, *29,* 1351).

P. ceylanica (Wt.) Miq. syn. *Pygeum gardneri* Hook.f., *P. wightianum* Bl. ex C.Muell., *P. wightianum* Bl. ex C.Muell. var. *parvifolium* Thw. ex Hook.f., *P. glaberrimum* Hook.f., *P. acuminatum* Coleb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 531).

Crystal structure of euscaphic acid determined (*J. Chem. Res., Synop.* 1994, 122; *Chem. Abstr.* 1994, *120,* 299023 c).

P. communis Huds.; see *P. domestica* L.

P. cornuta (Wall. ex Royle) Steud. syn. *P. padus* Hook.f. (non L.), *Padus cornuta* (Wall. ex Royle) Carr. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 329).

Two new lignans - ssioriside and prupaside - isolated from bark, latter characterised as (8R,7S,8'R)5,5'-dimethoxylariciresinol-9'-O-β-D-xylopyranoside (*Chem. Pharm. Bull.* 1989, *37,* 3301); four new polyacylated sucrose esters isolated from bark and characterised as 3-O-p-coumaroyl-β-D-fructofuranosyl-2,3,4,6-tetra-O-acetyl-α-D-glucopyranoside, 1-O-acetyl-3-O-p-coumaroyl-β-D-fructofuranosyl-2,3,6-tri-O-acetyl-α-D-glucopyranoside, 1-O-acetyl-3-O-p-coumaroyl-β-D-fructofuranosyl-3,4,6-tri-O-acetyl-α-D-glucopyranoside and 1-O-acetyl-3-O-p-coumaroyl-β-D-fructofuranosyl-3,6-di-O-acetyl-α-D-glucopyranoside (*Chem. Pharm. Bull.* 1990, *38,* 415); a new methyl ester of melilotoside isolated from sapwood and characterised as methyl O-coumarate-β-D-glucoside (*Phytochemistry* 1993, *32,* 431).

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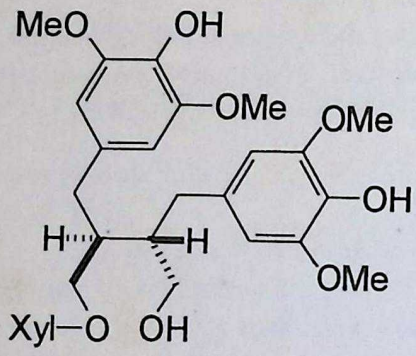
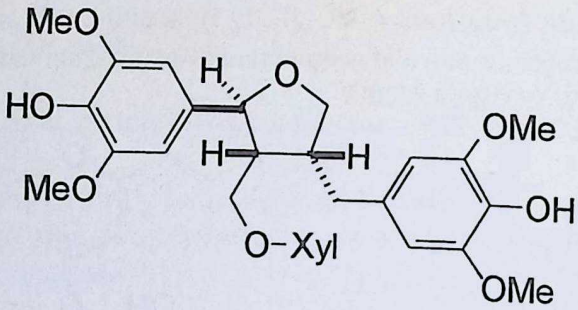


Ssioriside



Prupaside

P. domestica L. syn. *P. communis* Huds. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 600).

5,7,4'-Trihydroxy-3-methoxyflavanone, 3,5,7-trihydroxy-6,4'-dimethoxyflavanone, 3,5,7-trihydroxy-8,4'-dimethoxyflavanone, isosakuranetin, prudomestin, dihydrokaempferide and naringenin isolated from heartwood (*Phytochemistry* 1992, *31,* 2185).

P. dulcis (Mill.) D.A. Webb syn. *P. amygdalus* Batsch., *Amygdalus communis* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 600).

Oil from seeds of plant collected around Konya region contained myristic, palmitic, stearic, oleic and linoleic acids as identified by GC (*Doga: Turk Biyol. Derg.* 1991, *15,* 206; *Chem. Abstr.* 1992, *116,* 252088 e).

P. macrophylla Sieb. & Zucc.; see *P. zippeliana* Miq.

P. padus L.; see *P. cornuta* (Wall. ex Royle) Steud.

P. persica (L.) Batsch. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 601).

Hexane extract of seeds inhibited mutagenicity of benzo[a]pyrene, 3-amino-1,4-dimethyl-5H-pyrido[4,3-b]indole and 2-(2-furyl)-3-(5-nitro-2-furyl)acrylamide (*Yakugaku Zasshi* 1992, *112,* 934; *Chem. Abstr.* 1993, *118,* 182894 e).

Hentriacontane, β-sitosterol, its glucoside, ursolic acid, mandelic acid and quercetin identified in leaves (*Fitoterapia* 1990, *61,* 379); structure of gibberellin GA86 (1,2-dihydro-GA32) established by synthesis (*Tetrahedron Lett.* 1991, *32,* 6203); determination of 1-naphthylacetic acid and 2-(1-naphthyl)-acetamide in fruit by HPLC and GC-MS (*Ernaehrung* (Vienna) 1992, *16,* 274; *Chem. Abstr.* 1993; *118,* 5809 k); heneicosane, dotriacontane, tritetra-

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contane, cyclododecyne, ethyl hexadecanoate, dotriacontan-1-ol, β-sitosterol, squalene, kaempferol, quercetin, ursolic acid and vitamin E isolated from leaves (*Zhonghua Yaoxue Zazhi* 1992, *44,* 281; *Chem. Abstr.* 1993, *118,* 19197 w); oleic acid (1.5) and linoleic acid (0.5%) identified as active components in fruits (*Yakugaku Zasshi* 1992, *112,* 934; *Chem. Abstr.* 1993, *118,* 182894 e); 4-naphthyl-naphthoquinone isolated as antifungal compound from essential oil (*Pharm. Pharmacol. Lett.* 1993, *2,* 203; *Chem. Abstr.* 1994, *120,* 129519 b).

BIOLOGICAL ACTIVITY

4-Naphthyl-naphthoquinone exhibited antifungal activity against *Aspergillus flavus* with minimum ED1000 μg/ml (*Pharm. Pharmacol. Lett.* 1993, *2,* 203; *Chem. Abstr.* 1994, *120,* 129519 b).

P. prostrata Labill.

Four new compounds isolated from aerial parts and characterised as 5-(β-D-glucosyloxy)-2-(3-hydroxybutyl)-1,3,3-trimethylcyclohexane, 4-(β-D-glucosyloxy)-3-(3-methyl-2-butenyl)benzoic acid, fraxinol-6β-D-galactopyranoside and 6,7-dihydroxy-5-methoxycoumarin-6β-D-glucoside; in addition, dihydroquercetin, β-sitosterol galactoside, ampelopsionoside, boscialin-4'-β-glucoside, mandshurin, fraxinol, herniarin, umbelliferone and kaempferol also isolated (*J. Nat. Prod.* 1993, *56,* 2142).

Distribution: Himalayas, Himachal Pradesh, alt. 1500-3000 m.

P. puddum (Roxb. ex Ser.) Roxb. ex Brand.; see *P. cerasoides* D.Don

P. zippeliana Miq. syn. *P. macrophylla* Sieb. & Zucc.

β-Sitosterol, its glucoside, stigmasterol, its glucoside and acetate, clerosterol, 22-dehydroclerosterol and its acetate, ursolic acid, its 2α-hydroxy derivative, oleanolic acid, tormentic acid, methyl linolate, phytol, prunasin, mandelic acid and its glucoside and kaempferol-3-O-[α-L-rhamnopyranosyl(1→6)-β-D-glucoside] isolated from leaves and branches (*Chem. Pharm. Bull.* 1993, *41,* 2007).

Distribution: Nagaland.

PSEUDOELEPHANTOPUS (Asteraceae)

P. spicatus (Juss.) Rohr. ex Gleason

Two new germacranolides - spicatolides A and B - isolated and their crystal structures determined; stigmasterol and glaucolide B also isolated (*Phytochemistry* 1993, *33,* 627).

Distribution: Native to Tropical South America, now common weed in West Bengal, Uttar Pradesh and elsewhere.

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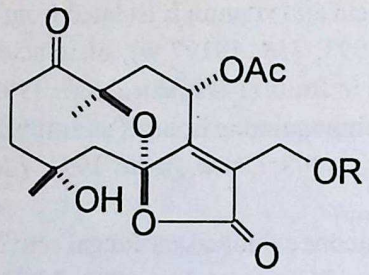

Spicatolide A
R = Ac
Spicatolide B
R = Et

PSIDIUM (Myrtaceae)

P. guajava L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 602).

Flavonol fraction inhibited peristalsis of guinea ileum *in vitro*. Spasmolytic activity of leaf is mainly due to presence of quercetin (*Arch. Med. Res.* 1994, *25,* 11; *Chem. Abstr.* 1994, *121,* 148748 n).

Gibberellins A1 and A5 synthesised (*Chem. Pharm. Bull.* 1990, *38,* 276); α-pinene (37.8) and 1,8-cineole (18.9%) determined in leaf essential oil (*J. Essent. Oil Res.* 1991, *3,* 187; *Chem. Abstr.* 1991, *115,* 119897 f); lauric and myristic acids as major constituents (34.0%), β-caryophyllene and oxygen-containing sesquiterpenes (25.0%) as well as caryophylladienols identified in essential oil of fruit of Nigerian plant (*Flavour Fragrance J.* 1991, *6,* 233; *Chem. Abstr.* 1992, *116,* 150390 e); capric, lauric, myristic, palmitic, stearic and oleic acids, glucose, fructose, sucrose, arabinose, galactose, myo-inositol and an acidic polysaccharide composed of rhamnose, arabinose, galactose and glucuronic acid isolated from leaves (*Dhaka Univ. Stud.* 1991, *39*B, 159; *Chem. Abstr.* 1992, *116,* 170128 d); six new complex tannins - guajavins A and B, psidinins A, B and C and psiguavin - isolated from bark and their structures determined (*Chem. Pharm. Bull.* 1992, *40,* 2092); (+)gallocatechin identified in leaves (*Phytochemistry* 1994, *36,* 1027); isolation of guajavarin, isoquercetin, hyperin, quercitrin and quercetin-3-O-gentiobioside from leaves (*Arch. Med. Res.* 1994, *25,* 11; *Chem. Abstr.* 1994, *121,* 148748 n).

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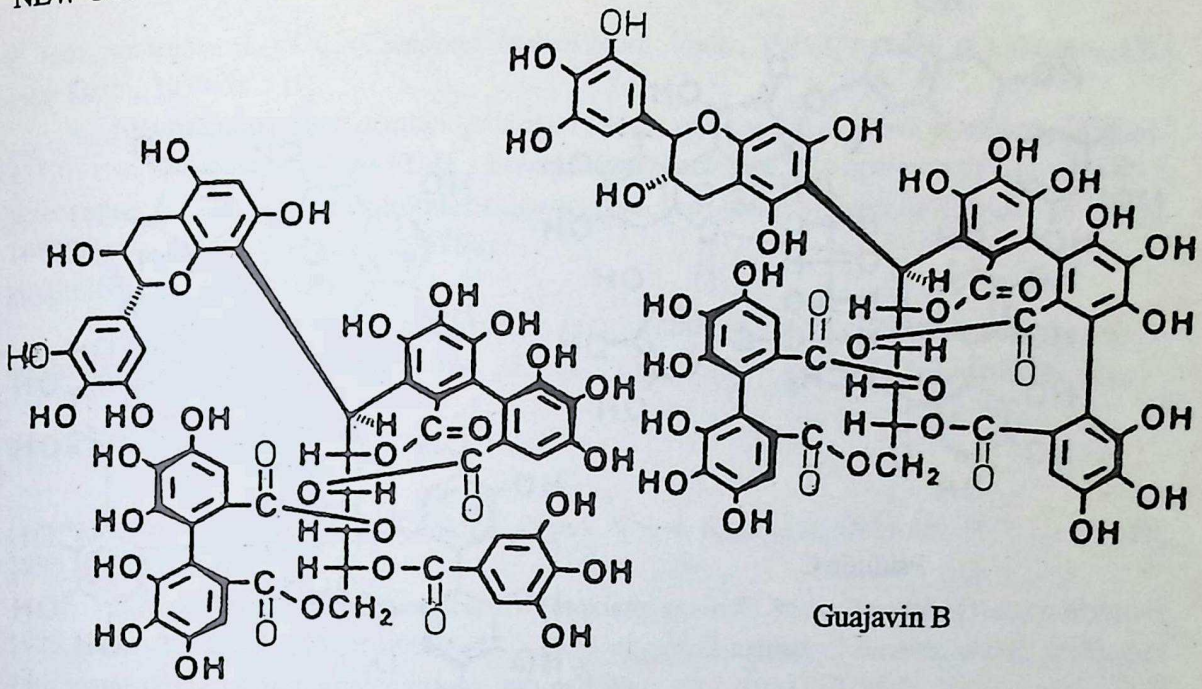
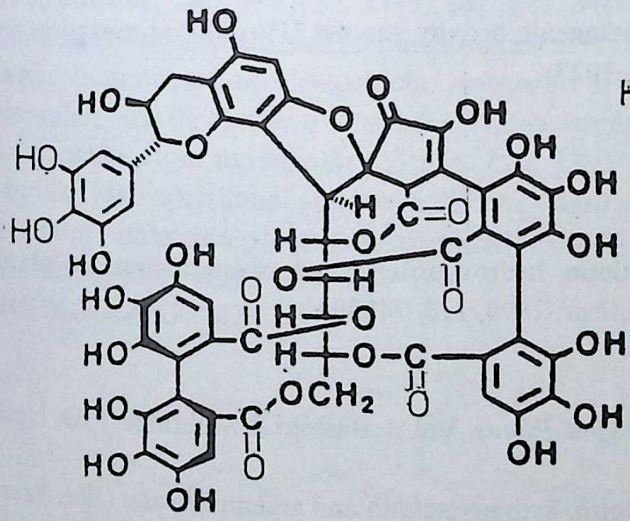
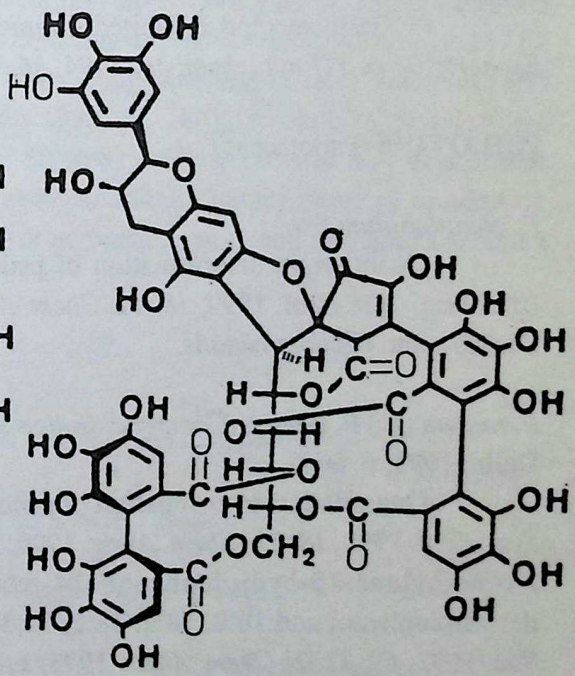


Guajavin A

Guajavin B



Psidinin A



Psidinin B

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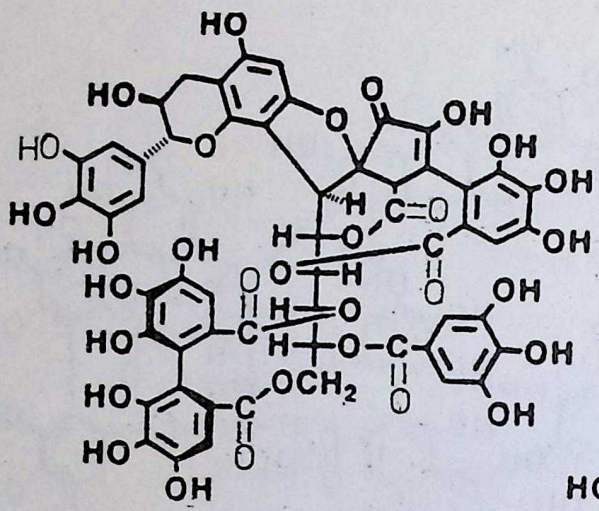
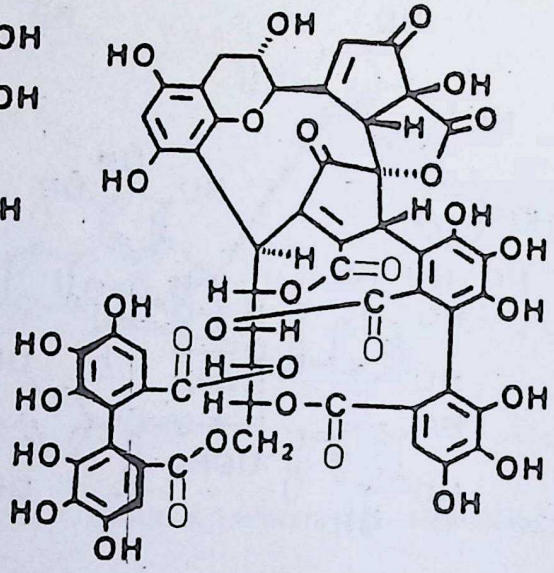


Psidinin C



Psiguavin

BIOLOGICAL ACTIVITY

(+)Gallocatechin exhibited antimutagenic activity against UV-induced mutation in *Escherichia coli* (*Phytochemistry* 1994, *36*, 1027).

PSILOTUM (Psilotaceae)

P. complanatum Sw.

Quantitative determination of psilotin, hydroxypsilotin and amentoflavone in plant (*Biochem. Syst. Ecol.* 1990, *18*, 11; *Chem. Abstr.* 1990, *113*, 74859 k).
Distribution: Nicobar Islands.

P. nudum (L.) P. Beauv. *(Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 604).

Quantitative determination of psilotin, hydroxypsilotin and amentoflavone (*Biochem. Syst. Ecol.* 1990, *18*, 11; *Chem. Abstr.* 1990, *113*, 74859 k); codisterol, isofucosterol, avenasterol, 24-methylene-25-hydrolophenol, 24-methylene-5α-lanost-8-en-3β-ol, 24β-methyl-25-dehydrolophenol and 16:0, 18:1, 18:2, 18:3 and 20:3 fatty acids isolated (*J. Am. Oil Chemists Soc.* 1992, *69*, 1232; *Chem. Abstr.* 1993, *118*, 56222 w).

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PSOPHOCARPUS (Papilionaceae)

P. tetragonolobus (L.) DC. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 535).

Identification of N^6-methylagmatine in seeds and seedlings (*Phytochemistry* 1990, *29,* 1313); two isolectins - L-I and L-II - isolated from leaves and their amino acid composition determined; L-I contains a disulphide bridge between two subunits (*Plant Cell Physiol.* 1994, *35,* 1087; *Chem. Abstr.* 1994, *121,* 276764 b).

BIOLOGICAL ACTIVITY

Isolectin L-I exhibited high haemagglutinating activity towards human type A erythrocytes (*Plant Cell Physiol.* 1994, *35,* 1087; *Chem. Abstr.* 1994, *121,* 276764 b).

PSORALEA (Papilionaceae)

P. corylifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 604).

Ethanol extract of fruits exhibited cytotoxicity against L929 cell culture (*Yakugaku Zasshi* 1989, *109,* 926; *Chem. Abstr.* 1990, *112,* 91377 y); petrol extract of roots inhibited feeding of 48th instar larvae of *Spodoptera litura* (*Indian J. Exp. Biol.* 1992, *30,* 858).

Bakuchiol isolated from fruits (*Yakugaku Zasshi* 1989, *109,* 926; *Chem. Abstr.* 1990, *112,* 91377 y; *Heterocycles* 1990, *31,* 187; *ibid.* 1992, *34,* 1555); synthesis of (+)bakuchiol (*Tetrahedron Lett.* 1990, *31,* 3325); two new coumestans - bavacoumestans A and B - isolated from seeds and characterised; sophoracoumestan A also isolated (*Phytochemistry* 1990, *29,* 2371); a new furanocoumarin - bakuchicin - isolated from seeds along with stigmasterol, bukuchiol and psoralen, and its structure established (*Heterocycles* 1990, *31,* 187); isolation of psoralen and isopsoralen from roots (*Indian J. Exp. Biol.* 1992, *30,* 858); isolation of two new benzofuran derivatives - corylifonol and isocorylifonol - from seeds and their characterisation; in addition psoralen, bukuchiol, angelicin, corylifolinin, p-hydroxybenzoic acid and astragalin isolated (*Heterocycles* 1992, *34,* 1555).

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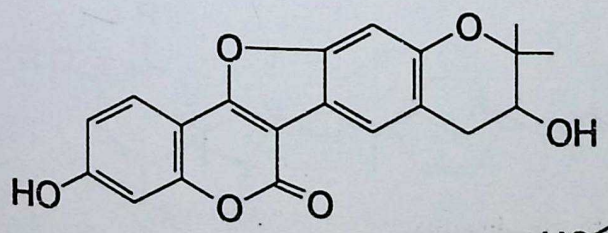
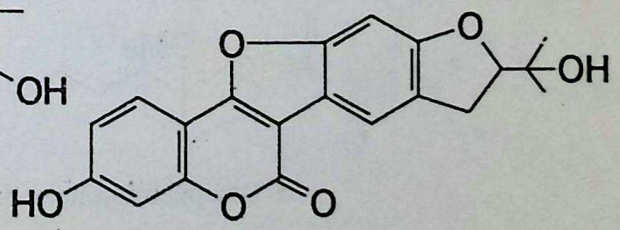


Bavacoumestan A



Bavacoumestan B

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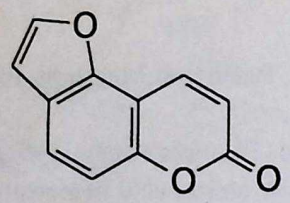
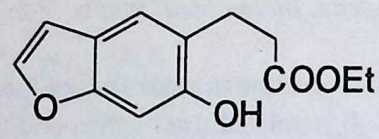
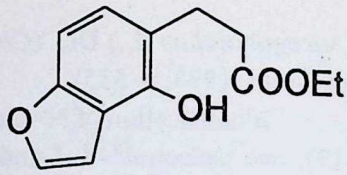


Bakuchicin



Corylifonol



Isocorylifonol

BIOLOGICAL ACTIVITY

Bakuchiol exhibited irreversible cytotoxicity against L929 cell culture in short time (*Yakugaku Zasshi* 1989, *109,* 926; *Chem. Abstr.* 1990, *112,* 91377 y); it also exhibited cytotoxicity against cultured human cancer cell lines viz. A549, SK-OV-3, SK-MEL-2, XF 498 and HCT15 (*Arch. Pharmacal Res.* 1992, *15,* 356; *Chem. Abstr.* 1993, *119,* 173716 s).

P. plicata Delile (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 604).

Two new phenolic cinnamates - plicatins A and B - isolated and characterised (*Phytochemistry* 1990, *29,* 3979); isolation of a new coumestan - plicadin - and a new benzoquinone - α-tocopherolquinone methyl ether and their structure elucidation; in addition α-tocopherolquinone isolated (*Phytochemistry* 1991, *30,* 2800).

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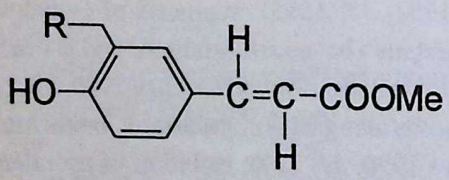
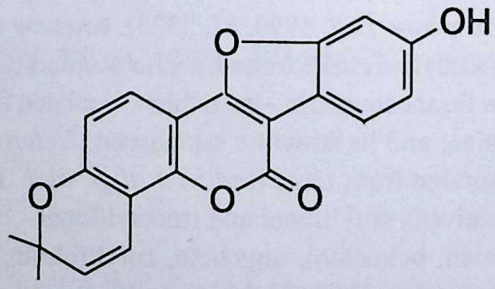
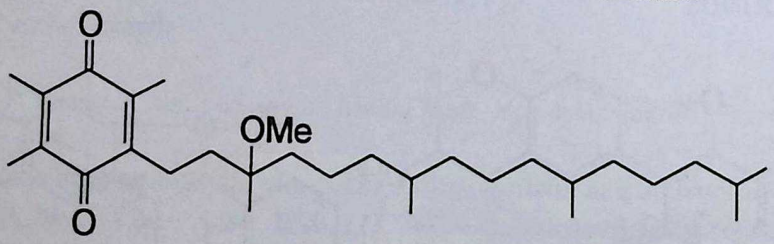


Plicatin A
R = CH(OH).C(Me)=CH_2
Plicatin B
R = CH=CMe_2



Plicadin



α-Tocopherolquinone methylether

PTERIS (Pteridaceae)

P. calomelanos (L.) Bedd.; see *Pityrogramma calomelanos* (L.) Link

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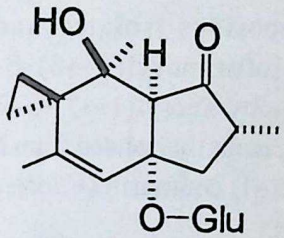
P. cretica L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 605).

A carcinogenic sesquiterpenoid - ptaquiloside - isolated and characterised (*Phytochemistry* 1990, *29,* 1475); hexanal, heptanal, hex-4-en-1-ol, hept-1-en-3-ol, vanillin, isobutyl isobutyrate, ethyl cinnamate and 3-hydroxy-2,2,4-trimethylpentyl isobutyrate identified in oil (*Yukagaku* 1993, *42,* 44; *Chem. Abstr.* 1993, *118,* 154259 h).

NEW COMPOUNDS



Ptaquiloside

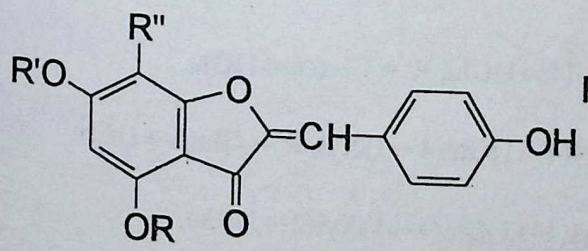
PTEROCARPUS (Papilionaceae)

P. marsupium Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 606).

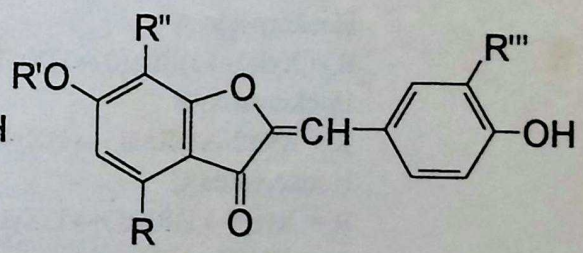
Administration of ethyl acetate extract for 14 consecutive days to rats produced significant reduction in levels of serum triglycerides, total cholesterol, and LDL- and VLDL-cholesterol without any significant effect on level of HDL-cholesterol (*J. Nat. Prod.* 1993, *56,* 989).

Isolation of two new aurones from flowers and their characterisation as 4,6,4'-trihydroxyaurone-6-O-rhamnopyranoside (I) and 4,6,4'-trihydroxy-7-methylaurone-4-O-rhamnopyranoside (II) (*Phytochemistry* 1989, *28,* 1287); two new aurones isolated from heartwood and their structures determined as 6,4'-dihydroxy-7-methylaurone-6-O-rhamnopyranoside (III) and 4,6,3',4'-tetrahydroxyaurone-6-O-rhamnopyranoside (IV) (*Phytochemistry* 1989, *28,* 2529); isolation of marsupsin, pterosupin and liquiritigenin from heartwood (*J. Nat. Prod.* 1993, *56,* 989).

NEW COMPOUNDS



I
R,R''= H, R' = Rha
II
R = Rha, R' = H, R'' = Me



III
R,R''' = H, R'= Rha, R'' = Me
IV
R,R''' = OH, R' = Rha, R''= H

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BIOLOGICAL ACTIVITY

Liquiritigenin and pterosupin significantly lowered serum cholesterol, LDL-cholesterol and atherogenic index in rats. Pterosupin also lowered serum triglycerides (*J. Nat. Prod.* 1993, *56*, 989).

P. santalinus L.f. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 570).

Two new coumarin glycosides isolated and characterised as 7-hydroxy-6-methoxycoumarin-7-O-[β-D-apiofuranosyl(1→6)-β-D-glucoside] and 7-hydroxy-6-methoxycoumarin-7-O-[α-L-arabinopyranosyl(1→3)-β-D-galactosyl(1→6)-β-D-galactoside] (*Fitoterapia* 1992, *63*, 555); another coumarin isolated from heartwood and its structure determined as 5-hydroxy-7-O-(3-methylbut-2-enyl) coumarin (*Fitoterapia* 1993, *64*, 90).

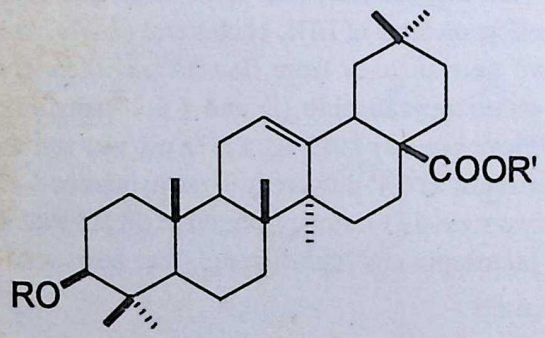
PTEROCEPHALUS (Dipsacaceae)

P. hookeri (Clarke) Hook. ex Diels syn. *Scabiosa hookeri* Clarke

Four new triterpenoid saponins - hookerosides A, B, C and D - isolated and their structures established (*Phytochemistry* 1993, *32*, 1535).

Distribution: Himalayas, from Nepal to Bhutan, alt. 3000-4500 m.

NEW COMPOUNDS



Hookeroside A

R = Xyl(2→1)Rha(3→1)Xyl(4→1)Glu, R' = Glu((6→1)Glu

Hookeroside B

R = Xyl(2→1)Rha(3→1)Xyl(4→1)Glu(4→1)Xyl, R' = Glu(6→1)Glu

Hookeroside C

R = Xyl(2→1)Rha(3→1)Xyl(4→1)Glu(4→1)Xyl(2→1)Rha,

R' = Glu(6→1)Rha

Hookeroside D

R = Xyl(2→1)Rha(3→1)Xyl(4→1)Glu(4→1)Xyl(2→1)Rha, R' = H

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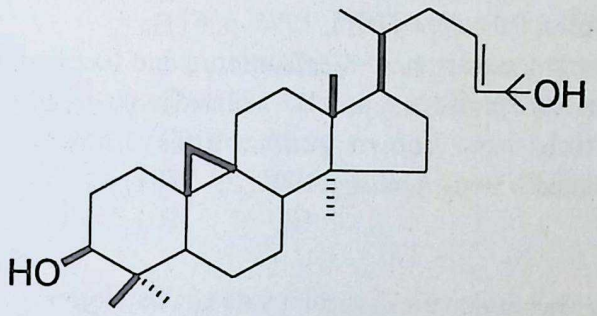
PTEROSPERMUM (Sterculaceae)

P. lanceaefolia Roxb. (lanceaefolium) (*Compend. Indian Med. Plants,* Vol. 4. Rastogi & Mehrotra, PID, New Delhi, 1995, p. 607).

A new triterpene - sterculin A - isolated from leaves and its structure determined; bauerenyl acetate and β-sitosterol also isolated (*Gaodeng Xuexiao Huaxue Xuebao* 1993, *14,* 214; *Chem. Abstr.* 1993, *119,* 91181 z).

NEW COMPOUNDS



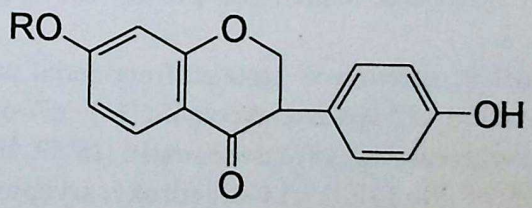
Sterculin A

PUERARIA (Papilionaceae)

P. lobata (Willd.) Ohwi (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 609).

A new glucoside isolated from roots and stems and its structure determined as 7,4'-dihydroxyisoflavanone-7-O-β-D-(6"-O-malonyl)glucoside (I) (Jpn. 1,146,894 (1989) Jun. 08; *Chem. Abstr.* 1990, *112,* 42557 y).

NEW COMPOUNDS



I

R = Glu(6-malonyl)

BIOLOGICAL ACTIVITY

Isoflavanone glucoside (I) inhibited aldose reductase preparation from supernatant liquid of homogenised eye lens of rat (IC50 52.0 μM). It can be useful for treatment of diabetes complications such as cataract, retinopathy, neuropathy and kidney disorders (Jpn. 1,146,894

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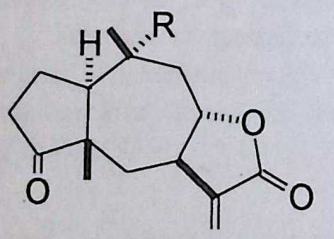
(1989) Jun. 08; *Chem. Abstr.* 1990, *112,* 42557 y); 8C-glucosyl-7,3',4'-trihydroxyisoflavone (II), coumesterol, daidzein, puerarin and its apioside, daidzin, 8C-glucosylgenistein and formononetin at 100 μM inhibited glyoxalase I by 82.0, 86.5, 53.0, 48.0, 51.0, 20.0 and 11.0% respectively. At lower concentration, effect of (II) on enzyme was weaker than that of baicalein and quercetin (*Nippon Eiyo Shokuryo Gakkaishi* 1991, *44,* 123; *Chem. Abstr.* 1991, *115,* 214617 y).

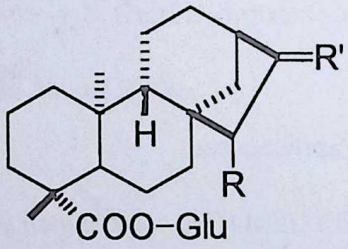
PULICARIA (Asteraceae)

P. crispa (Forsk.) Benth. & Hook. syn. *Francoeuria crispa* Cass. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 611).

Two new sesquiterpene lactones - 8-epiconfertin and 10α-hydroxy-8-epiconfertin - and two diterpene glycosides - crispiosides A and B - isolated from aerial parts and their structures determined; in addition three known guaianolides, nine xanthanolides and three pseudoguaianolides isolated (*Phytochemistry* 1990, *29,* 2581).

NEW COMPOUNDS





8-Epiconfertin
R = H
10α-Hydroxy-8-epiconfertin
R = OH

Crispioside A
R = O-Glu, R' = CH_2
Crispioside B
R = H, R' = α-OH,β-CH_2OH

P. dysenterica (L.) Gaertn. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 539).

Six new caryophyllene derivatives isolated from aerial parts and characterised as (1S,5S,6S,9R,11S)5,14-dimethoxy-12-acetoxycaryophyll-2(15)-en-7-one (I), (1S,5S,6S,9R,11S)-5,14-dimethoxy-12-hydroxycaryophyll-2(15)-en-7-one (II), (1S,6R,9R)14-hydroxy-caryophyll-2(15)-en-7-one (III), (1S,6R,9R,11R)13,14-dihydroxycaryophyll-2(15)en-7-one (IV), (1S,9R,11S)14-methoxy-12-acetoxycaryophylla-2(15),5(Z)-dien-7-one (V) and (1S,9R)14-methoxycaryophylla-2(15),5(Z)-dien-7-one (VI); in addition twelve known caryophyllenes isolated (*Phytochemistry* 1992, *31,* 2409).

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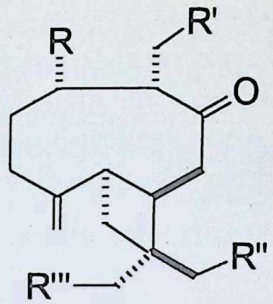
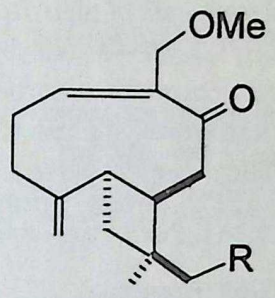




	R	R'	R''	R'''
I	OMe	OMe	OAc	H
II	OMe	OMe	OH	H
III	H	OH	H	H
IV	H	OH	H	OH

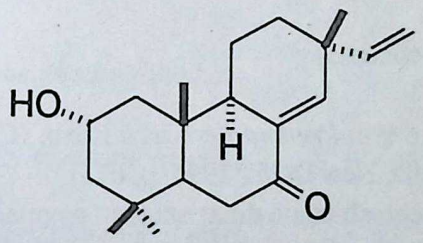
V
R = OAc
VI
R = H

P. wightiana (DC.) Clarke

A new isopimarane isolated and characterised as isopimara-8(14),15-diene-7-keto-2α-ol (I) (*J. Nat. Prod.* 1992, *55*, 1328).

Distribution: Peninsular India.

NEW COMPOUNDS



I

PUNICA (Punicaceae)

P. granatum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 611).

Fruit extract exhibited high activity against *Micrococcus pyogenes* var. *aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. It also showed activity against intestinal pathogenic bacilli such as *Salmonella typhosa*, *S. monterideo*, *S. schottmuelleri* and *Shigella paradysenteriae*. Aqueous extract of roots completely inhibited activity of *Mycobacterium tuberculosis*-607 (*Sachitra Ayurveda* 1991, *43*, 750).

Four new alkaloids - A1, A2, A3 and A4 - isolated from root bark along with pelletierine, isopelletierine, pseudopelletierine, methylpelletierine and methylisopelletierine (*Sachitra Ayurveda*

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1991, *43*, 750); pelletierine, N-methylpelletierine, pseudopelletierine, seldridine, 2-(2'-hydroxypropyl)-piperidin-1-ene, 2-(2'-propenyl)-piperidin-1-ene and norpseudopelletierine isolated from bark of plant from Yogoslavia (*Pharmazie* 1993, *48*, 389; *Chem. Abstr.* 1993, *119*, 135641 f); 1,2,3-tri-O-galloyl-β-glucopyranose isolated from leaves and characterised; in addition, brevifolin, brevifolin carboxylic acid, corilagin, ellagic acid, granatin B, punicafolin, 3,6(R)hexahydroxydiphenoyl-(α/β)-glucopyranose, 1,2,6-tri-O-galloyl-β-glucopyranose, 1,4,6-tri-O-galloyl-β-glucopyranose and 3,4,8,9,10-pentahydroxy-dibenzo[b,d]pyran-6-one isolated (*Phytochemistry* 1994, *36*, 793).

PYGEUM (Rosaceae)

P. acuminatum Coleb.; see *Prunus ceylanica* (Wt.) Miq.

P. gardneri Hook.f.; see *Prunus ceylanica* (Wt.) Miq.

P. glaberrimum Hook.f.; see *Prunus ceylanica* (Wt.) Miq.

P. wightianum Bl. ex C.Muell.; see *Prunus ceylanica* (Wt.) Miq.

P. wightianum Bl. ex C.Muell. var. *parvifolium* Thw. ex Hook.f.; see *Prunus ceylanica* (Wt.) Miq.

PYGMAEOPREMNA (Verbenaceae)

P. herbacea (Roxb.) Moldenke syn. *Premna herbacea* Roxb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 613).

Two new 20(10→5)abeo-abietane diterpenoids - pygmaeocins B and C - isolated from roots and their structures elucidated (*Helv. Chim. Acta* 1990, *73*, 455); another diterpenoid - pygmacone - isolated from root nodules and characterised (*Phytochemistry* 1991, *30*, 359); total synthesis of pygmaeocin B (*Tetrahedron Lett.* 1994, *35*, 423).

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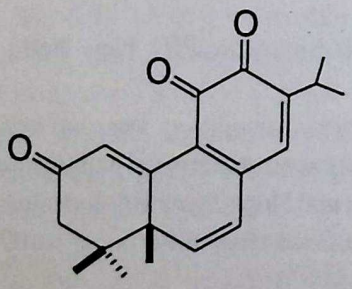
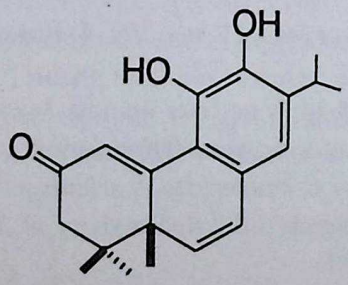
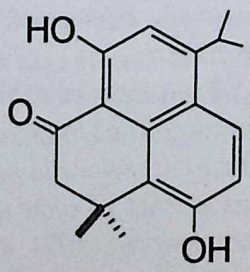


Pygmaeocin B



Pygmaeocin C



Pygmacone

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PYRROSIA (Polypodiaceae)

P. lingua (Thunb.) Farwell syn. *Niphobolus heteractis* sensu Bedd.,p.p. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 614).

Water-soluble fraction of methanolic extract inhibited in dose-dependent manner platelet aggregation induced by ADP and collagen whereas water-insoluble fraction exhibited high inhibitory effect in ADP- but not collagen-induced platelet aggregation (*Osaka-fruitsu Koshu Eisei Kenkyusho Kenkyu Hokoku, Yakuji Shido-hen* 1991, *25,* 39; *Chem. Abstr.* 1992, *116,* 227914 p).

Isolation of astragalin and liquiritin from fronds (*Saengyak Hakhoechi* 1992, *23,* 276; *Chem. Abstr.* 1993, *119,* 188377 f); hexanal, hex-4-en-1-ol, hept-1-en-3-ol, vanillin and 3-hydroxy-2,2,4-trimethylpentyl isobutyrate identified as major components in volatile oil (*Yukagaku* 1993, *42,* 44; *Chem. Abstr.* 1993, *118,* 154259 h).

PYRUS (Rosaceae)

P. baccata L.; see *Malus baccata* (L.) Borkh.

P. malus L.; see *Malus pumila* Mill.

QUAMOCLIT (Convolvulaceae)

Q. coccinea Moench; see *Ipomoea hederifolia* L.

Q. pinnata (Desr.) Bojer; see *Ipomoea quamoclit* L.

Q. phoenicea Chois.; see *Ipomoea phoenicea* Roxb.

QUASSIA (Simaroubaceae)

Q. amara L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 615).

Two new canthin-6-one alkaloids characterised as 3-methyl-4-methoxy-5-hydroxycanthin-2,6-dione and 4-methoxy-5-hydroxycanthin-6-one-N3 -oxide isolated from wood along with 3-methylcanthin-5,6-dione (*Planta Med.* 1990, *56,* 216); three new quassinoids - 1α-O-methylquassin, 11α-O-glucopyranosyl-16α-O-methylneoquassin and 12α-hydroxy-13,18-dehydroparaine - isolated from wood and their structures elucidated; 16α-O-methylneoquassin and 11-acetylparaine also isolated (*Phytochemistry* 1993, *32,* 1007); isolation and structure determination of a new alkaloid - 2-methoxycanthin-6-one - from wood (*Planta Med.* 1993, *59,* 259).

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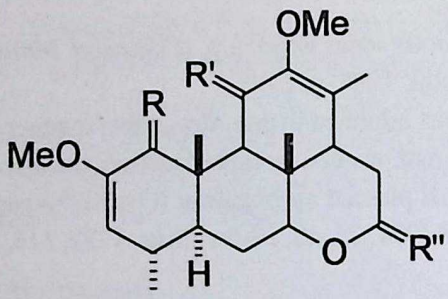
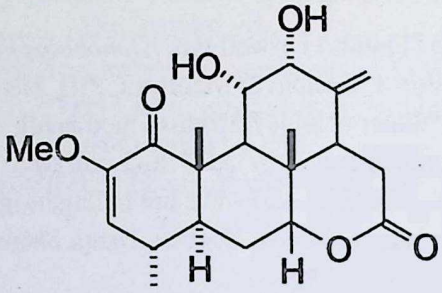
NEW COMPOUNDS





11α-O-Glucosyl-16α-O-methylneoquassin
R = O, R' = β-O-Glu,H, R" = α-OMe,H
1α-O-Methylquassin
R = β-OMe,H, R',R" = O

12α-Hydroxy-13,18-dehydroparaine

Q. indica (Gaertn) Nooteb.; see *Samadera indica* Gaertn.

QUERCUS (Fagaceae)

Q. acutissima Carruth. syn. *Q. serrata* sensu Hook.f. (non Thunb.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 616).

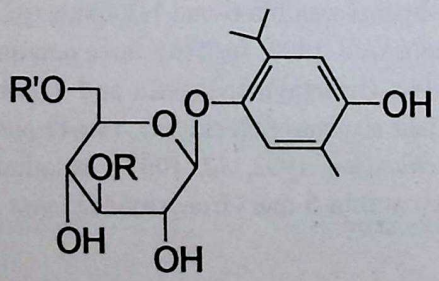
Aqueous extract of leaves showed good antioxidant activity at 100-5000 ppm in lard and fish oil (*Agric. Biol. Chem.* 1991, *55,* 1397).

Antioxidant constituent, ellagic acid, isolated (*Agric. Biol. Chem.* 1991, *55,* 1397); two ester saponins - dotorioside I and dotorioside II - isolated from fruits and characterised as 2α, 3β, 19α,23-tetrahydroxyolean-12-en-28-oic acid-β-D-glucopyranoside and 2α,3β,19α,23-tetrahydroxyurs-12-en-28-oic acid-β-D-glucopyranoside respectively (*Yakhak Hoechi* 1994, *38,* 223; *Chem. Abstr.* 1994, *121,* 226425 w).

Q. glauca Thunb. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 575).

Two new phenol glucoside gallates - querglanin and isoquerglanin - isolated from leaves and their structures determined (*Phytochemistry* 1992, *31,* 2465); isolation of β-sitosterol from stem bark (*Indian J. Chem.* 1992, *31*B, 133).

NEW COMPOUNDS



Querglanin
R = H, R' = Galloyl
Isoquerglanin
R = Galloyl, R' = H

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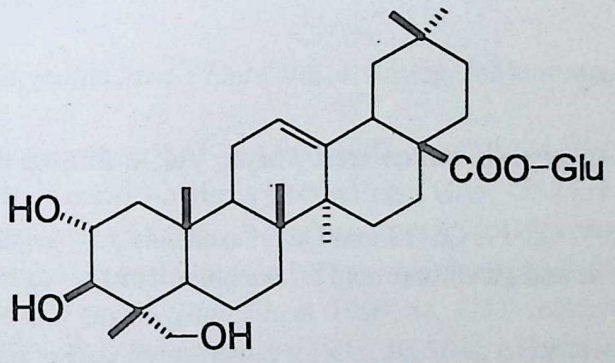
Q. glomerata Roxb.; see *Lithocarpus elegans* (Blume) Hatus ex Soepadmo

Q. ilex L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 619).

Tellimoside, tilliroside, isoquercitrin, quercetin-3-O-β-D-sophoroside, isorhamnetin-3-O-β-D-glucopyranoside, kaempferol-3-O-β-D-rutinoside, kaempferol-3-O-β-D-(6"-galloyl)-glucopyranoside, kaempferol-3-O-β-D-(2",6"-di-trans-p-coumaroyl)glucopyra-noside (I), kaempferol-3-O-β-D-(2"-cis-p-coumaroyl-6"-trans-p-coumaroyl)glucopyranoside, kaempferol-3-O-β-D-(3",4"-di-acetyl-2",6"-di-trans-p-coumaroyl)glucopyranoside (II) and kaempferol-3-O-β-D-(2",3"-diacetyl-4"-cis-p-coumaroyl-6"-trans-p-coumaroyl)glucopyranoside isolated (*Pharmzie* 1991, *46,* 679; *Chem. Abstr.* 1992, *116,* 170146 h); flavonoids previously described as kaempferol-3-O-β-D-(2",4"-di-O-trans-p-coumaroyl) glucopyranoside and kaempferol-3-O-β-D-(3",6"-di-O-acetyl-2",4"-di-O-trans-p-coumaroyl)glucopyranoside were found to be identical to I and II respectively (*Arch. Pharm.* 1991, *324,* 519; *Chem. Abstr.* 1991, *115,* 228376 f); a new glycoside - arjunglucoside II - isolated and its structure established (*Pharmazie* 1992, *47,* 877; *Chem. Abstr.* 1993, *119,* 68036 x).

NEW COMPOUNDS



Arjunglucoside II

Q. infectoria Oliv. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 576)

Isolation of amentoflavone hexamethyl ether, isocryptomerin and β-sitosterol from fruits (*Fitoterapia* 1991, *62,* 293).

Q. polystachya Wall. ex DC.; see *Lithocarpus polystachya* (Wall. ex DC.) Rehd.

Q. serrata Thunb.; see *Q. acutissima* Carruth.

Q. spicata Smith; see *Lithocarpus elegans* (Blume) Hatus ex Soepadmo

Q. spicata Smith var. *chittagonga* Hook.f.; see *Lithocarpus elegans* (Blume) Hatus ex Soepadmo

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Q. spicata Smith var. *depressa* (Blume) King; see *Lithocarpus elegans* (Blume) Hatus ex Soepadmo

Q. spicata Smith var. *glaberrima* (Blume) Miq.; see *Lithocarpus elegans* (Blume) Hatus ex Soepadmo

Q. spicata Smith var. *gracilipes* (Miq.) Miq.; see *Lithocarpus elegans* (Blume) Hatus ex Soepadmo

Q. spicata Smith var. *microcalyx* (Korth.) Miq.; see *Lithocarpus elegans* (Blume) Hatus ex Soepadmo

Q. suber L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p 619).

Two new acylated flavonoids isolated and characterised as kaempferol-3-O-β-D-(2"-O-trans-p-coumaroyl)glucopyranoside and kaempferol-3-O-β-D-[2",3"-di-O-acetyl)-4"-O-(cis-p-coumaroyl)-6"-O-(trans-p- coumaroyl)]glucopyranoside (*Arch. Pharm.* 1991, *324*, 519; *Chem. Abstr.* 1991, *115*, 228376 f); arjunglucoside II isolated (*Pharmazie* 1992, *47*, 877; *Chem. Abstr.* 1993, *119*, 68036 x).

QUILLAJA (Rosaceae)

Q. saponaria Molina (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 619).

Saponins QS-7, QS-17, QS-18 and QS-21 isolated; their sugar moieties composed of fucose, xylose, galactose and glucuronic acid (*J. Immunol.* 1991, *146*, 431; *Chem. Abstr.* 1991, *114*, 220951 y).

BIOLOGICAL ACTIVITY

Saponins QS-7 and QS-21 showed negative or very low toxicity in mice whereas QS-18 was found to be most toxic (*J. immunol.* 1991, *146*, 431; *Chem. Abstr.* 1991, *114*, 220951 y).

RABDOSIA (Lamiaceae)

R. coetsa (Buch.-Ham. ex D.Don) Hara; see *Plectranthus japonicus* (Burm.f.) Koidz. var. *japonicus*

R. rugosa (Wall. ex Benth.) Hara; see *Plectranthus rugosus* Wall. ex Benth.

RADERMACHERA (RADERMACHIA) (Bignoniaceae)

R. borii Fischer; see *R. sinica* (Hance) Hemsl.

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R. sinica (Hance) Hemsl. syn. *R. borii* Fischer (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 620).

Four new monoterpenoids isolated from roots and leaves and characterised as 8-hydroxy-2,6-dimethylocta-(2E,6E)-dienolic acid, its glucopyranosyl ester, 8,10-dihydroxy-2-methylocta-(2E,6E)-dienoylcatalpol and 6-O-(3-methoxy-4-hydroxybenzoyl)ajugol; specioside, minecoside, nemoroside, nemoroside I and amphicoside also isolated (*Phytochemistry* 1990, *29,* 1913).

RANDIA (Rubiaceae)

R. dumetorum Lamk.; see *Xeromphis spinosa* (Thunb.) Keay

R. longiflora Lamk.; see *Oxyceros longiflora* (Lamk.) Yamazaki

R. longispina Wt. & Arn.; see *Xeromphis spinosa* (Thunb.) Keay

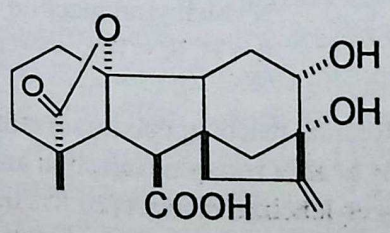
R. uliginosa DC.; see *Xeromphis spinosa* (Thunb.) Keay

RAPHANUS (Brassicaceae)

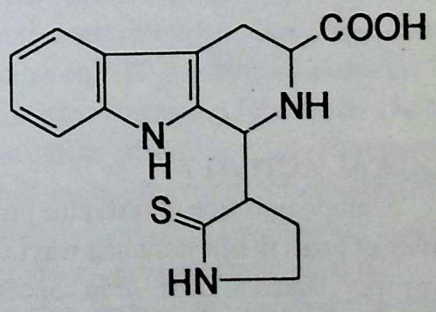
R. sativus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 621).

Seven 13-hydroxygibberellins - GA1, 3-epi-GA1, GA8, GA17, GA19, GA20 and GA77 (new) - together with four non-13-hydroxygibberellins - GA9, GA24, 12β-hydroxy-GA24 and GA25 - isolated from mature seeds (*Agric. Biol. Chem.* 1990, *54,* 837); a new β-carboline derivative (I) isolated from roots and characterised as 1-(2'-pyrrolidinethion-3'-yl)-1,2,3,4-tetrahydro-β-carboline-3-carboxylic acid (*Agric. Biol. Chem.* 1990, *54,* 1241); castasterone and brassinolide identified in seeds by GC-MS (*Phytochemistry* 1991, *30,* 364); isolation of trans-4-(methylthio)-3-butenyl glucosinolate from roots (*J. Agric. Food Chem.* 1992, *40,* 1687; *Chem. Abstr.* 1992, *117,* 149570 c); identification of 28-homoteasterone and teasterone in seeds by GC-MS (*Phytochemistry* 1993, *34,* 391).

NEW COMPOUNDS



GA77



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BIOLOGICAL ACTIVITY

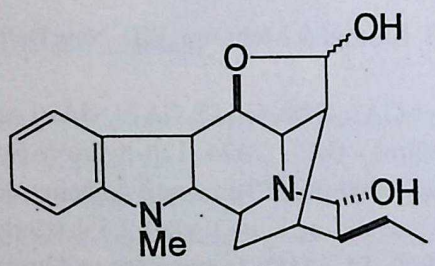
A purified basic protein, homologous to nonspecific lipid transfer proteins, from seeds showed antifungal activity (*Plant Physiol.* 1992, *100,* 1055; *Chem. Abstr.* 1992, *117,* 248594 v).

RAUVOLFIA (Apocynaceae)

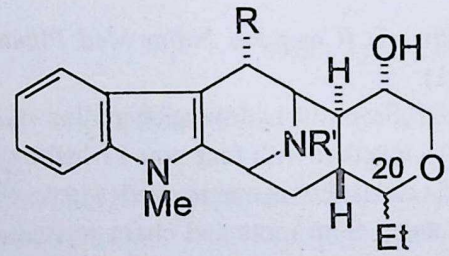
R. serpentina (L.) Benth. ex Kurz (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 621).

Enantioselective synthesis of (+)reserpinine (*Tetrahedron Lett.* 1990, *31,* 2705); (+)yohimbine synthesised (*Tetrahedron Lett.* 1990, *31,* 4755); new alkaloids - 20(S)raumacline, N^b-methylraumacline, 6α-methoxyraumacline, 6α-hydroxyraumacline, 20(R)isoraumacline and alkaloid G - isolated from cell suspensions in presence of ajmaline and their structures determined; 6α-hydroxyraumacline also synthesised (*Planta Med.* 1992, *58,* 410; *Phytochemistry* 1993, *32,* 725); enantiospecific total synthesis of (–)raumacline and (–)N^b-methylraumacline (*J. Am. Chem. Soc.* 1992, *114,* 6910); a new alkaloid - 12-hydroxyajmaline - isolated from hairy roots and its structure determined; 3-epi-α-yohimbine and 18β-hydroxy-3-epi-α-yohimbine also isolated (*Can. J. Chem.* 1993, *71,* 2201).

NEW COMPOUNDS



Alkaloid G



20(S)Raumacline
R,R' = H, ~~ = β
20(R)Isoraumacline
R,R' = H, ~~ = α
6α-Hydroxyraumacline
R = OH, R' = H, ~~ = β
6α-Methoxyraumacline
R = OMe, R' = H, ~~ = β
N^b-Methylraumacline
R = H, R' = Me, ~~ = β

BIOLOGICAL ACTIVITY

A single injection of reserpine produced bradycardia reaching maximum effect in 8 hr. Sensitivity of heart to acetylcholine was increased at 24 hr after reserpine injection and effect of reserpine was related to increase in concentration of acetylcholine in heart (20.8% in atria and 113.3% in ventricles). Maximum bradycardiac effect of reserpine was associated with decreased in acetylcholinesterase activity whereas increased sensitivity to acetylcholine was associated

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with increase in choline acetyltransferase (*Krovoobrashchenie* 1989, *22,* 51; *Chem. Abstr.* 1990, *113,* 204651 z); acetylcholine accumulated in heart of rats in early period following reserpine administration (within 8 hr) because of inhibition of hydrolysis of mediator (*Fiziol. Zh.* 1990, *36,* 94; *Chem. Abstr.* 1991, *114,* 35887 u); reserpine (1.0 mg/kg, i.p.) not only reduced cAMP levels in both cerebral cortex and hippocampus in WC1 mice but also potentiated degree of seizures elicited by CL (coriaria lactone). Reserpine injection could shorten latency of CL-seizures and decrease its threshold (*Huaxi Yike Daxue Xuebao* 1990, *21,* 307; *Chem. Abstr.* 1991, *114,* 35903 w); level of tele-methylhistamine, a major metabolite of histamine (HA), was decreased by reserpine (1.0-5.0 mg/kg, s.c.) in dose-dependent manner in all regions of brain in mice, whereas HA level was unaffected. Results suggest that there may be both reserpine-resistant and reserpine-sensitive HA pools in histaminergic nerve endings and most of neuronal HA in brain may be located in former pool (*J. Pharmacol. Exp. Ther.* 1991, *256,* 967); study of effect of reserpine on vascular and intestinal smooth muscles showed that it inhibits L-type Ca^{2+} channels to inhibit smooth muscle contraction (*Jap. J. Pharmacol.* 1992, *60,* 291); reserpine inhibited high K^+-induced contraction of rabbit vascular and intestinal smooth muscles which was antagonised by increase in external Ca^{2+} concentration. Thus, it inhibited L-type Ca^{2+} channels to inhibit smooth muscle contraction (*Jap. J. Pharmacol.* 1992, *60,* 291).

Yohimbine hydrochloride (5.0, 10.0 μg/0.01 ml/rat) or vehicle injected i.c.v. in 52 weeks-old male Wistar rats. Each male was then given opportunity to mate with receptive female for 30 min. Yohimbine produced decrease in latency to initial mounting and increase in number of mountings. However, there was no ejaculation in yohimbine and vehicle-treated males (*Exp. Anim.* 1991, *40,* 337; *Chem. Abstr.* 1992, *116,* 120726 b); yohimbine (2.0 mg/kg) known to facilitate coupling behaviour in male rats, caused decrease in locomotor activity (*Pharmacol., Biochem., Behav.* 1992, *41,* 707; *Chem. Abstr.* 1992, *117,* 40254 b); yohimbine reduced neuropathology (formation of vacuoles in large cortical neurons and neuropil) induced by ketamine/xylazine anaesthesia, speeding recovery after surgical procedure (*Physiol. Behav.* 1992, *51,* 657; *Chem. Abstr.* 1992, *116,* 228117 t); pre-treatment of dogs with yohimbine prevented xylazine-induced retrograde flow of spermatozoa into urinary bladder (*J. Vet. Pharmacol. Ther.* 1994, *17,* 169; *Chem. Abstr.* 1994, *121,* 221680 r); salivary secretion was increased significantly for 45 min following administration of yohimbine (0.5 mg/kg, i.v.) to anaesthetised dogs. Sectioning of chorda tympani nerve abolished yohimbine-induced increase in resting salivary secretion. Results showed that yohimbine increases submaxillary secretion by inhibition of presynaptic α-adrenoceptors located on chorda tympani which inhibit cholinergic transmission (*Brit. J. Pharmacol.* 1989, *98,* 101); effect of yohimbine on ATP-sensitive K^+ channels studied in normal mouse β-cells. In presence of 3.0 mM glucose which opened ATP-sensitive K^+ channels, yohimbine (20.0 to 100.0 mM) inhibited ^{86}Rb efflux from islets. However, in presence of 6.0 mM when most of the channels are closed, this efflux was unaffected by yohimbine (200.0 mM) (*Brit. J. Pharmacol.* 1990, *101,* 115); yohimbine (1.0 mg/kg/hr, i.v.) caused slight central sympathoexcitation in anaesthetised rabbits with uninterrupted sympathetic impluse traffic. It also enhanced renal and total body spillover of norepinephrine at any given firing rate of renal

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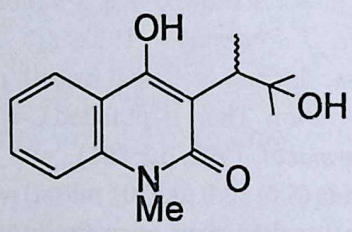
sympathetic nerves (*J. Pharmacol. Exp. Ther.* 1992, *260,* 780); rauvolscine elicited sustained contraction in dog mesenteric artery precontracted with 20.0 mM KCl or 1.0 nM endothelin 1; results suggest that rauvolscine is a partial agonist with lower intrinsic activity than 5-HT and acts at the same 5-HT_1-like receptors (*J. Pharmacol. Exp. Ther.* 1993, *264,* 201).

RAVENIA (Rutaceae)

R. spectabilis Engl. syn. *Limonia spectabilis* Lindl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 625).

Isolation of a new alkaloid - paraensine - and its structure determination (*Fitoterapia* 1990, *61,* 282).

NEW COMPOUNDS



Paraensine

REISSANTIA (Hippocrateaceae)

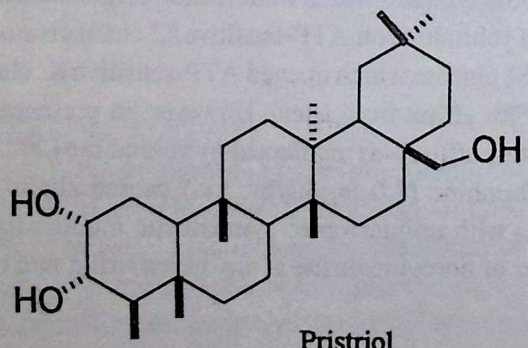
R. grahamii (Wt.) Ding Hou syn. *Hippocratia grahamii* Wt., *Pristimera grahamii* A.C. Smith

Mar. - Danshir, Daushir, Lokandi, Yesti and Zewati.

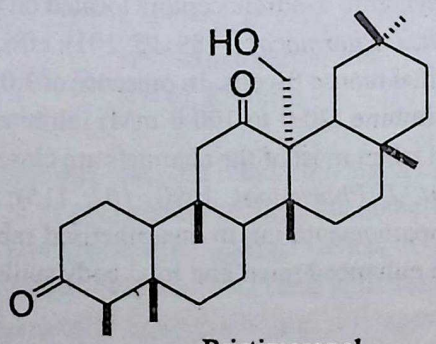
Isolation of a new triterpenoid - pristimeronol - from leaves and its structure determined as 27-hydroxyfriedelan-3,12-dione; friedelin, epifriedelinol, epifriedelinyl acetate, octacosanol and canophyllol also isolated (*Phytochemistry* 1990, *29,* 2027); a new triterpene alcohol - pristriol - isolated from roots and characterised as friedelan-2α,3α,28-triol; in addition, friedelin, epifriedelinol, 3α-hydroxyfriedelan-2-one, friedelan-3α,28-diol, canophyllol, α- and β-amyrins and pachysandiol A isolated (*Phytochemistry* 1990, *29,* 3044).

Distribution: Western Ghats, Peninsular India and South Andamans.

NEW COMPOUNDS



Pristriol



Pristimeronol

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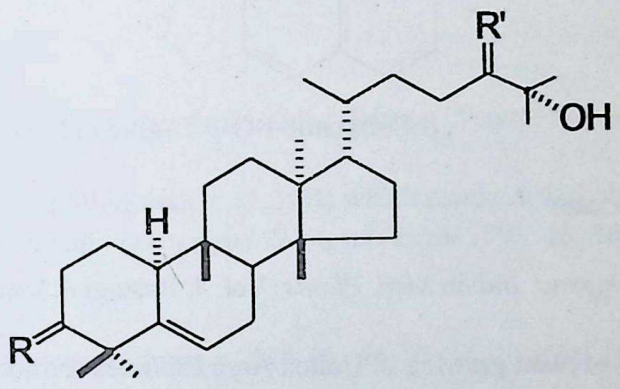
R. indica (Willd.) Halle syn. *Pristimera indica* (Willd.) A.C. Smith, *Hippocratea indica* Willd. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 625).

Isolation and structure elucidation of three new reissantane triterpenoids - reissantenol oxide (24-oxoreissant-5-en-3β,25-diol), 3-oxoreissant-5-en-24β,25-diol and reissant-5-en-3β,24β,25-triol - from root bark; reissanteol oxide (reissantiol oxide), canophyllol, pristimerin, tingenone, D:B-friedo-olean-5-en-3β,29-diol and sitosterol also isolated (*J. Chem. Soc.* Perkin 1 1989, 2259).

NEW COMPOUNDS



Reissantenol oxide
R = β-OH,H, R' = O
3-Oxoreissant-5-en-24β,25-diol
R = O, R' = β-OH,H
Reissant-5-en-3β,24β,25-triol
R,R' = β-OH,H

RHAMNUS (Rhamnaceae)

R. triquetra Wall. ex Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 626).

Kaempferol, its 7-O-methyl ether and 4'-O-methyl ether, physcion-8β-D-glucoside, emodin and its 8β-D-glucoside isolated from whole plant (*Fitoterapia* 1994, *65,* 275).

BIOLOGICAL ACTIVITY

Emodin inhibited cell cycle from G1 into S phase in kidney glomerular cells as determined by immunohistological method using proliferating cell nucleus antigen as a probe (*Xibao Shengwuxue Zazhi* 1993, *15,* 174; *Chem. Abstr.* 1994, *121,* 405 c); emodin exhibited CNS depressant activity (*Fitoterapia* 1994, *65,* 275).

R. wightii Wt. & Arn. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 211).

Isolation of chrysophanol, physcion, musizin, lupeol, rhamnazin, rhamnocitrin, emodin, frangulin A and β-sitosterol from leaves (*Acta Cienc. Indica, Chem.* 1991, *17,* 391; *Chem. Abstr.*

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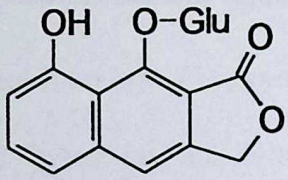
1992, *117*, 44567 d); a new naphthalene glucoside lactone - β-sorigenin-1-O-β-D-glucoside - isolated from stem bark and its structure elucidated; in addition, cynodontin, chrysophanol, physcion, musizin, lupeol, emodin, β-sorigenin, 7-hydroxy-5-methoxyphthalide, β-sitosterol and its glucoside isolated (*Phytochemistry* 1991, *30*, 4193).

NEW COMPOUNDS



β-Sorigenin-1-O-β-D-glucoside

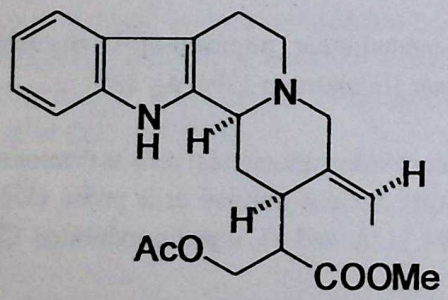
RHAZYA (Apocynaceae)

R. stricta Decne. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 626).

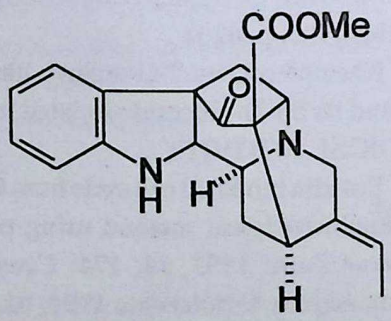
Root extract of plant growing in United Arab Emirates showed anti-microbial activity (*Arab Gulf J. Sci. Res.* 1994, *12*, 119; *Chem. Abstr.* 1994, *121*, 200861 k).

Review on alkaloids (*Fitoterapia* 1989, *60*, 291); three new alkaloids - 16(R),19,20(E)-isositsirikine acetate, leepacine and dihydroeburnamenine - isolated from roots and leaves and their structures determined; in addition, (–)16(R),21(R)-O-methyleburnamine, 2-ethyl-3[2-(3-ethylpiperidino)ethyl]-indole, 20(S)19,20-dihydrocondylocarpine and N-acetylaspidospermidine isolated (*Phytochemistry* 1991, *30*, 1285); synthesis of geissoschizine (*Heterocycles* 1992, *34*, 1497); strictanol, tetrahydrosecamine, akuammidine and rhazimanine isolated (*Arab Gulf J. Sci. Res.* 1994, *12*, 119; *Chem. Abstr.* 1994, *121*, 200861 k).

NEW COMPOUNDS



16(R),19,20(E)-Isositsirikine acetate



Leepacine

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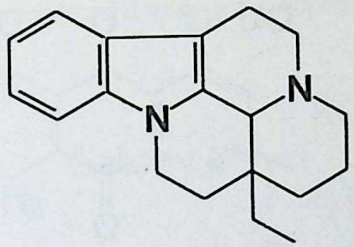


Dihydroeburnamenine

RHEUM (Polygonaceae)

R. emodi Wall. ex Meissn. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 212).

Plant contained anthraquinones (2.24%) which comprised of physcion, chrysophanol, emodin, rhein and aloe emodin (*Zhongguo Zhongyao Zazhi* 1993, *18,* 488; *Chem. Abstr.* 1994, *120,* 27479 w).

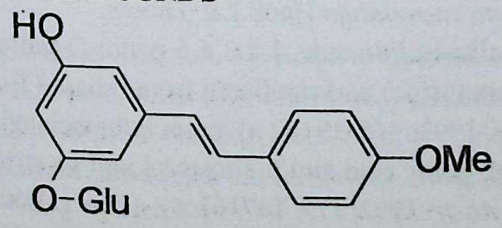
R. officinale Baillon (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 629).

Plant extract found to be strong and effective scavenger of oxygen radicals in xanthine/ xanthine oxidase and other systems *in vitro* and it may probably contribute to anti-aging and health protection through scavenging of oxygen radicals and depressing lipid peroxidation (*Fujian . Shifan Daxue Xuebao Ziran Kexueban* 1993, *9,* 68; *Chem. Abstr.* 1994, *121,* 170471 p).

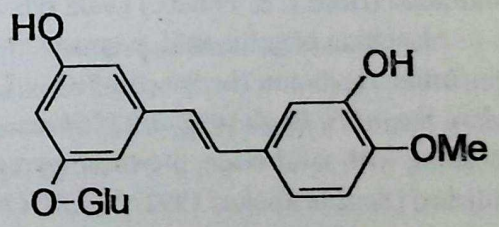
R. palmatum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 630).

Two new stilbene glycosides - 4'-O-methylpiceid and rhapontin - isolated from roots and their structures determined (*J. Nat. Prod.* 1991, *54,* 1115); isolation and structure elucidation of a new cytotoxic anthraquinone glucoside - pulmatin - from roots along with its congeners, chrysophanein and physcionin (*Phytochemistry* 1992, *31,* 1063); two polysaccharides - DHP1 and DHP2 - isolated from roots and rhizomes; both polysaccharides contained lyxose, glucose, galactose, xylose, rhamnose, mannose and ribose (*Zhongguo Zhongyao Zazhi* 1993, *18,* 679; *Chem. Abstr.* 1994, *120,* 240069 u).

NEW COMPOUNDS



4'-O-Methylpiceid



Rhapontin

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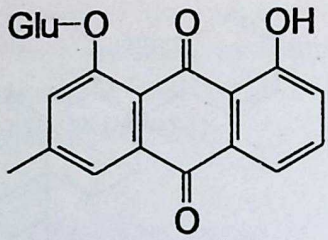


Pulmatin

BIOLOGICAL ACTIVITY

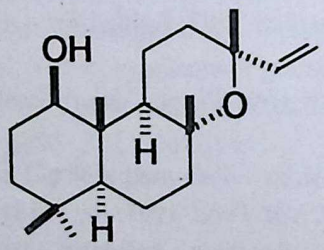
4'-O-Methylpiceid and rhapontin exhibited moderate α-glucosidase inhibitory activity (*J. Nat. Prod.* 1991, *54,* 1115); pulmatin, physcionin and chrysophanein showed moderate cytotoxic activity against several types of carcinoma cells (*Phytochemistry* 1992, *31,* 1063).

RHIZOPHORA (Rhizophoraceae)

R. apiculata Blume syn. *R. conjugata* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 583).

A new triterpenoid - taraxeryl cis-p-hydroxycinnamate - isolated from leaves along with taraxerol and careaborin (taraxeryl trans-p-hydroxycinnamate) (*J. Nat. Prod.* 1990, *53,* 953); a diterpene - apiculol - isolated from roots and characterised as 1-hydroxyepimanoyl oxide (*Nat. Prod. Lett.* 1994, *4,* 149; *Chem. Abstr.* 1994, *121,* 200884 v).

NEW COMPOUNDS



Apiculol

R. conjugata L.; see *R. apiculata* Blume

RHODIOLA (Crassulaceae)

R. crenulata (Hook.f. & Thoms.) Ohba syn. *Sedum crenulatum* Hook.f.& Thoms.

Isolation of gallic acid, p-tyrosol, 6-O-galloylsalidroside, 1,2,3,4,6-penta-O-galloyl-β-D-glucoside, rhodionin (herbacetin-7-O-α-L-rhamnoside) and rhodiosin from tubers (*Tianran Chanwu Yanjiu Yu Kaifa* 1992, *4,* 23; *Chem. Abstr.* 1993, *118,* 19182 n); crenulatin isolated from roots along with salidroside, p-tyrosol, pyrogallol, gallic acid and β-sitosterol and its structure established (*Yaoxue Xuebao* 1992, *27,* 117; *Chem. Abstr.* 1992, *117,* 147161 w); a new gallotannin - crenulatin* - isolated from stems and its structure determined (*Chinese Chem. Lett.* 1992, *3,* 111; *Chem. Abstr.* 1992, *117,* 108121 p; *Planta Med.* 1993, *59,* 80).

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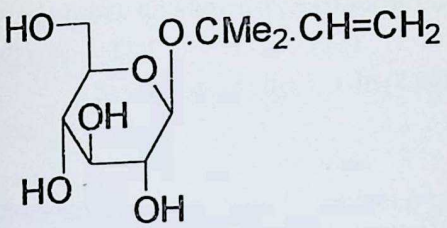
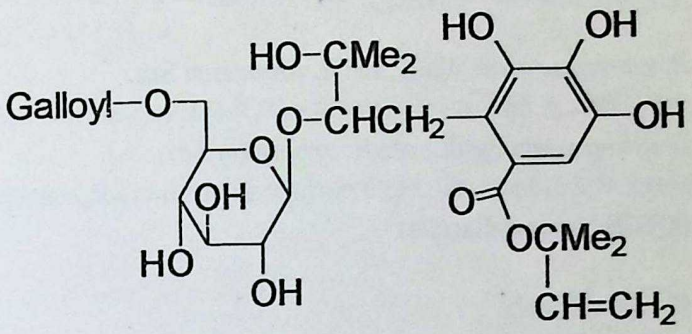
Distribution: Himalayas, from Kumaon to Bhutan, alt. 3600-5300 m.

NEW COMPOUNDS



Crenulatin



Crenulatin*

Note: Trivial name, crenulatin, given above to two different compounds; same name has also been given to a different compound isolated from *Citrus reticulata* (*Phytochemistry* 1987, *26*, 3096).

R. fastigiata (Hook.f. & Thoms.) Fu syn. *Sedum fastigiatum* Hook.f. &Thoms.

Daucosterol, herbacetin-8-arabinoside, p-tyrosol, gallic acid, its ethyl ester, β-sitosterol and its 3-O-galactoside isolated from rhizomes (*Zhiwu Xuebao* 1991, *33*, 61; *Chem. Abstr.* 1991, *115*, 131984 q).

Distribution: Himalayas, from Kashmir to Bhutan, alt. 3600-5500 m.

R. himalensis (D.Don) Fu syn. *Sedum himalense* D.Don

Isolation of daucosterol, tricin, maltose, β-sitosterol, gallic acid and its ethyl ester from roots and rhizomes (*Yunnan Zhiwu Yanjiu* 1989, *11*, 219; *Chem. Abstr.* 1990, *112*, 33339 b).

Distribution: Himalayas, from Nepal to Bhutan, alt. 3600-4800 m.

R. sacra (R.-Hamet) Fu syn. *Sedum sacrum* (R.-Hamet) Ohba

Umbelliferone, tyrosol, kaempferol, daucosterol, rhodioloside, salidroside, caffeic acid, gallic acid, its ethyl ester and β-sitosterol isolated from roots (*Tianran Chanwu Yanjiu Yu Kaifa* 1991, *3*, 6; *Chem. Abstr.* 1991, *115*, 26001 u).

Distribution: Nepal Himalayas, alt. 2400-3200 m.

RHODODENDRON (Ericaceae)

R. arboreum Sm. syn. *R. nilagiricum* Zenk., *R. cinnamomeum* Wall. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 631).

Isolation of flavone 5,2'-dihydroxy-7-methoxy-4'-O-glucoside and dimethyl ester of terephthalic acid from leaves (*Indian Drugs* 1991, *29*, 83).

R. barbatum Wall. ex G.Don (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 631).

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Hentriacontanol, friedelin, β-amyrin, oleanolic acid, ursolic acid and β-sitosterol isolated from stems (*Fitoterapia* 1993, *64,* 474).

R. cinnamomeum Wall.; see *R. arboreum* Sm.

R. nilagiricum Zenk.; see *R. arboreum* Sm.

RHUS (Anacardiaceae)

R. alata Thunb.

Benulin and semimoronic acid isolated from leaves (*Curr. Sci.* 1989, *58,* 1326).

Distribution: Introduced into India in Mizoram and some other parts of north-eastern India.

R. chinensis Mill.; see *R. javanica* L.

R. coriaria L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 631).

Limonene, nonanal and dec-2(Z)-enal obtained from pericarp oil whereas leaf oil contained β-caryophyllene and patchoulane. Cembrene and β-caryophyllene obtained from branch and bark oil (*J. Essent. Oil Res.* 1993, *5,* 481; *Chem. Abstr.* 1994, *121,* 153275 k).

R. javanica L. (*javanicus*) syn. *R. chinensis* Mill., *R. semialata* Murr. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID; New Delhi, 1995, p. 632).

6-Heptadeca-8,11,14-trienylsalicylic acid, 6-pentadec-8-enylsalicylic acid, 6-heptadeca-8,11-dienylsalicylic acid and 6-pentadecylsalicylic acid isolated (Jpn. 1,34,913 (1989) Feb. 06; *Chem. Abstr.* 1990, *112,* 42554 v); a new triterpene - semialatic acid - isolated and characterised as 3α-hydroxy-3β,19-epoxydammara-20,24(E)-dien-26-oic acid (*Phytochemistry* 1991, *30,* 2415); 3-heptadecylcatechol and β-sitosterol isolated (*Fitoterapia* 1994, *65,* 92).

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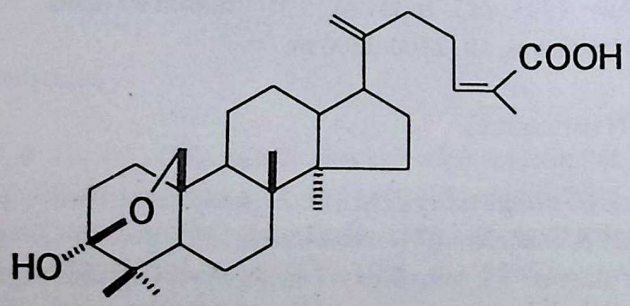

Semialatic acid

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BIOLOGICAL ACTIVITY

6-Pentadecylsalicylic acid had IC50 of 6.7 μg/ml against HeLa cells *in vitro* (Jpn. 1,34,913 (1989) Feb. 06; *Chem. Abstr.* 1990, *112,* 42554 v).

R. punjabensis Steward ex Brandis (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 551).

Semimoronic acid, 3-heptadecylcatechol and a hydrocarbon $C_{25}H_{52}$ isolated (*Fitoterapia* 1994, *65,* 92).

R. semialata Murr.; see *R. javanica* L.

RHYNCHOSIA (Papilionaceae)

R. bracteata Benth. ex Baker

Isolation of orientin, isoorientin, vitexin, isovitexin, vicenin 2 and lucenin 2 from leaves (*Fitoterapia* 1992, *63,* 283).

Distribution: Upper Gangetic plains.

R. jacobii Chandra & Shetty

Vitexin, isovitexin, orientin, isoorientin, vicenin 1 and vicenin 2 isolated from leaves (*Indian J. Nat. Prod.* 1989, *5*(1), 22; *Chem. Abstr.* 1990, *112,* 73907 s).

Distribution: Tirunelveli (Tamil Nadu).

R. minima (L.) DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 634).

A new steroidal glycoside - 3-O-β-D-galactosylstigmasta-5,22-diene - along with ergosterol peroxide, stigmasterol and lupeol isolated (*Phytochemistry* 1992, *31,* 4038); isolation of bergapten, isopimpinellin, umbelliferone and β-sitosterol from aerial parts (*Bull. Fac. Pharm.*, Cairo Univ. 1993, *31,* 29; *Chem. Abstr.* 1994, *120,* 240075 t).

RHYNCHOTECHUM (Gesneriaceae)

R. vestitum Hook.f. & Thoms.

Plant growing in southern part of Yunnan Province of China used as folk remedy for treatment of hepatitis.

A new anthraquinone - rhynchotechol - isolated from stems and roots and its structure elucidated; rubiadin, rubiadin-1-methyl ether, lupeol and β-sitosterol also obtained (*Yaoxue Xuebao* 1990, *25,* 699; *Chem. Abstr.* 1991, *114,* 160673 x).

Distribution: Himalayas, Sikkim, Bhutan, Meghalaya and north-eastern India, alt. 300-900 m.

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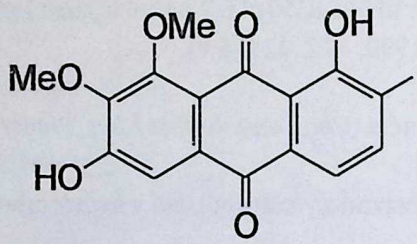

Rhynchotechol

RIBES (Grossulariaceae)

R. nigrum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 635).

Polyphenolic extract of buds inhibited lipid peroxidation by rat liver microsomes (*Planta Med. Phytother.* 1993, *26,* 207; *Chem. Abstr.* 1994, *120,* 330922 w).

γ-Elemene, γ-muurolene, ledene, bicyclogermacrene, germacrene B, trans- and cis-p-menth-2-en-1-ols, cis-limonene 1,2-epoxide, linalyl and neryl acetates and isospathulenol identified in bud essential oil (*J. Agric. Food Chem.* 1990, *38,* 3; *Chem. Abstr.* 1990, *112,* 53937 y); α-linolenic acid (48.0%) found in seed oil along with campesterol (8.0) and sitosterol (7.93%) (*Ann. Falsif. Expert. Chim. Toxicol.* 1992, *85,* 231; *Chem. Abstr.* 1993, *118,* 232615 n); a new prodelphinidin trimer, characterised as gallocatechin(4α→8)gallocatechin(4α→8)gallocatechin, isolated from leaves along with gallocatechin(4α→8)epigallocatechin and gallocatechin(4α→8)gallocatechin (*Phytochemistry* 1992, *31,* 971); identification of cis-6,9,12,15-octadecatetraenoic acid in seed oil by MS (*Chem. Phys. Lipids* 1992, *60,* 273; *Chem. Abstr.* 1992, *116,* 213228 f).

RICINUS (Euphorbiaceae)

R. communis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 635).

Anti-inflammatory effects of root extract investigated against carrageenin-, 5-hydroxytryptamine (5HT)-, dextran-, bradykinin- and prostaglandin E1 (PGE1)-induced rat hind paw oedema. Extract (0.15) g/kg) given orally 2 hr before injection of above phlogistic agents exhibited significant anti-inflammatory activity against all the agents except PGE1; efficacy of extract was: carrageenin > bradykinin > 5-HT > dextran (*Indian J. Pharmacol.* 1990, *22,* 239).

Lignins composed of guaiacyl-, syringyl- and p-hydroxyphenyl-propanes as building units isolated (*Himalayan Chem. Pharm. Bull.* 1989, *6,* 45; *Chem. Abstr.* 1990, *112,* 52307 f); isolation of (–)epicatechin, rutin, hyperoside, quercetin and 2,5-dihydroxybenzoic, chlorogenic, neochlorogenic and gallic acids from leaves (*Delta J. Sci.* 1992, *16,* 198; *Chem. Abstr.* 1993, *119,* 199530 b).

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BIOLOGICAL ACTIVITY

N-Demethylricinine (1.5-12.0 mg/kg, p.o. x 7) showed dose-dependent anticholestatic and hepatoprotective activities against paracetamol-induced hepatic damage, and choleretic activity in rats. Increase in volume of bile was evidence of choleretic and anticholestatic activities, while hepatoprotective effect was shown by increase in percent viability of hepatocytes and by reversal of altered GOT, GPT and alkaline phosphatase levels towards normal. It showed more potent activity than silymarin (*Drug Dev. Res.* 1992, *26,* 183; *Chem. Abstr.* 1992, *117,* 83201 z).

RIVEA (Convolvulaceae)

R. corymbosa Hailler f.; see *Turbina corymbosa* (L.) Rafin.

ROBINIA (Papilionaceae)

R. pseudoacacia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 636).

Determination of phenylethyl alcohol (12.07), linalool (3.11), geraniol (2.14), nerolidol (0.89), nonalactone (0.86), teresantalol (0.21), ethyl hexanoate (0.20), benzyl alcohol (0.17) and ethyl octanoate (0.13%) in flower essential oil by GC-MS (*Tianran Chanwu Yanjiu Yu Kaifa* 1991, *3,* 84; *Chem. Abstr.* 1992, *116,* 66882 j); isolation and structure elucidation of five new triterpene glycosides - robiniosides A, B, C, D and oxytrogenin-3-O-α-L-rhamnosyl(1→2)-β-D-galactopyranosyl(1→2)-β-D-glucuronopyranoside (I); in addition, kaikasaponin III and 3-O-α-L-rhamnopyranosyl(1→2)-β-D-galactopyranosyl(1→2)-β-D-glucuronopyranosyl-3β,22β-dihydroxyolean-12-en-29-oic acid isolated (*Chem. Pharm. Bull.* 1992, *40,* 2995); six new triterpene glycosides - robiniosides E, F, G, H, I and J - isolated from bark and their structures established (*Chem. Pharm. Bull.* 1993, *41,* 553); δ-car-3-ene (54.6), linalool (21.0), anthranilate aldehyde (3.9) and (Z)β-farnesene (3.0%) found in floral essential oil (*J. Essent. Oil Res.* 1994, *6,* 199; *Chem. Abstr.* 1994, *121,* 104041 x).

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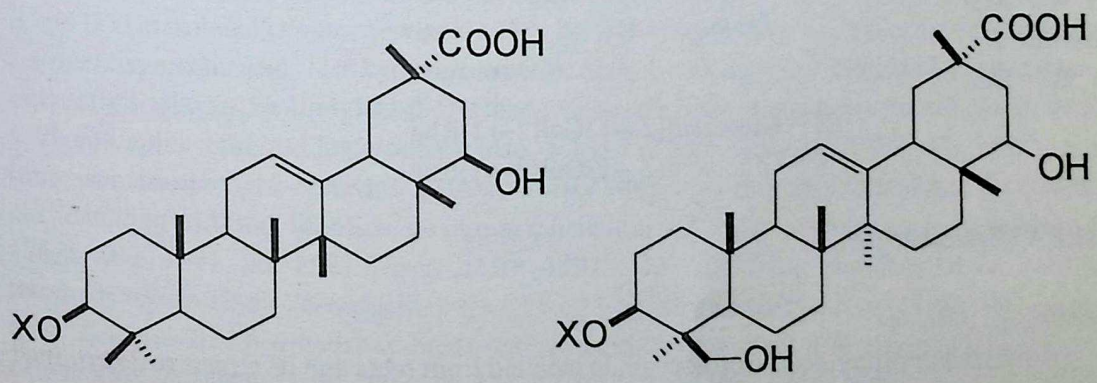

X = Gluc.acid(2→1)Glu(2→1)Rha

Robinioside A Robinioside B

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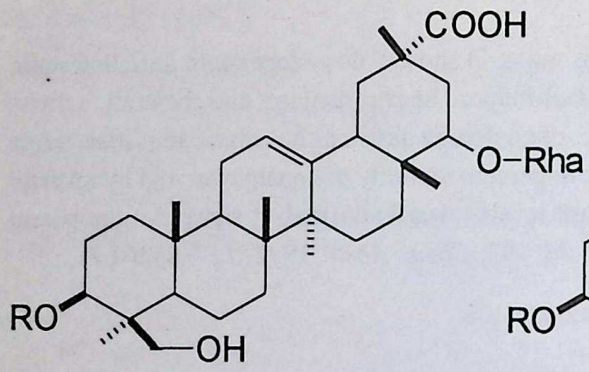
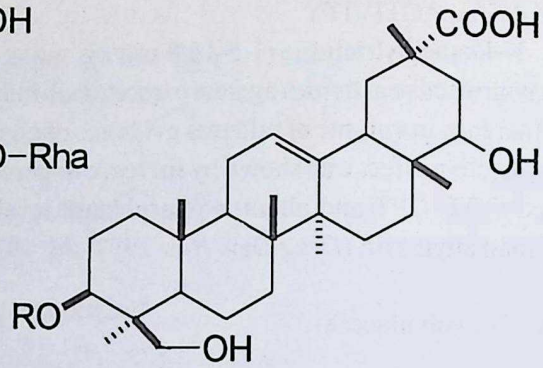
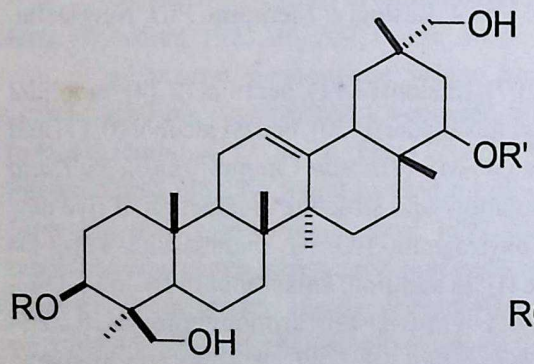


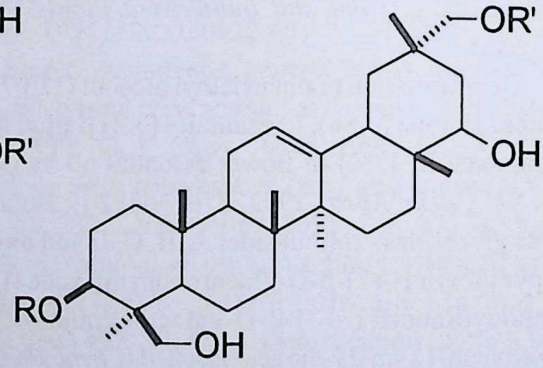
Robinioside C
R = Y
Robinioside D
R = X



I
R = Y



Robinioside E
R = X, R' = H
Robinioside F
R = Y, R' = H
Robinioside G
R = X, R' = Rha
Robinioside H
R = Y, R' = Rha



Robinioside I
R = X, R' = Glu(6→1)Apiose
Robinioside J
R = Y, R' = Glu(6→1)Apiose

X = Gluc.acid(2→1)Gal(2→1)Rha
Y = Gluc.acid(2→1)Gul(2→1)Rha

RORIPPA (Brassicaceae)

R. sylvestris (L.) Besser

8-Methylsulphinyloctyl isothiocyanate isolated from roots and its structure determined and confirmed by synthesis (*Agric. Biol. Chem.* 1989, *53*, 3361).

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Distribution: Kashmir, ascending to 1500 m.

BIOLOGICAL ACTIVITY

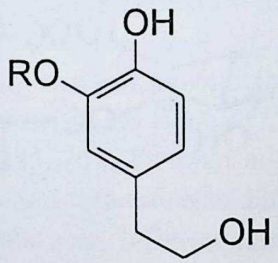
8-Methylsulphinyloctyl isothiocyanate at 200 ppm compeletly inhibited germination of *Lactua sativa* and at 0.4 mM reduced root and hypocotyl elongation of seedlings by 86.0 and 90.0% respectively (*Agric. Biol. Chem.* 1989, *53,* 3361).

ROSA (Rosaceae)

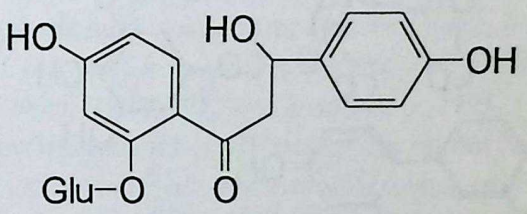
R. cymosa Tratt. syn. R. *microcarpa* Lindl. (non Retz.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 636).

Two new polyphenol glucosides - rocymosins A and B - isolated and characterised as 3-O-(6'-O-galloyl)β-D-glucopyranosyl-4-hydroxyphenethyl alcohol and 2'-O-β-D-glucopyranosyl-4,4',β-trihydroxy-dihydrochalcone respectively; casuarinin, rugosin D, stenophyllanins A and B, (+)catechin, procyanidin B3 and its 3-O-gallate and catechin(4α→6) catechin-(4α→6)epicatechin also isolated (*Phytochemistry* 1993, *32,* 1033).

NEW COMPOUNDS



Rocymosin A
R = Glu(6-galloyl)



Rocymosin B

R. laevigata Michx. syn. *R. sinica* sensu Hook.f. (non L., nec Ait.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 638).

Isolation and structure determination of three new dimeric ellagitannins - laevigatins E, F and G - from pericarp; agrimonic acid B, sanguiin H-4, pedunculagin, agrimonin and laevigatins B and D also isolated (*Phytochemistry* 1989, *28,* 2451); isolation and structure determination of 2α-methoxyursolic acid, 11α-hydroxytormentic acid, 6-methoxytormentic acid-β-glucopyranosyl ester, stigmasta-3α,5α-diol-3-O-β-D-glucopyranoside from aerial parts; ursolic acid, oleanolic acid, euscaphic acid and hederagenin also isolated (*Phytochemistry* 1991, *30,* 3383); cis- and trans-isomers of ethyl 2-benzyl-3-hydroxy-5-oxo-3-furancarboxylate isolated and their structures elucidated; in addition, loliolide, p-coumaric acid and 6,7-dimethoxycoumarin isolated (*J. Chin. Chem. Soc.* 1991, *38,* 297; *Chem. Abstr.* 1991, *115,* 89177 b); isolation of 2α,3β,19α,23-tetrahydroxyurs-12-en-28-oic acid, 2α,3α,19α,23-tetrahydroxyurs-12-en-28-oic acid, euscaphic acid, diacetyl-2α,3β-dihydroxy-lupan-28-oic acid, daucosterol and β-sitosterol from fruits (*Zhongguo Zhongyao Zazhi* 1993, *18,* 426; *Chem. Abstr.* 1993, *119,* 199587 a).

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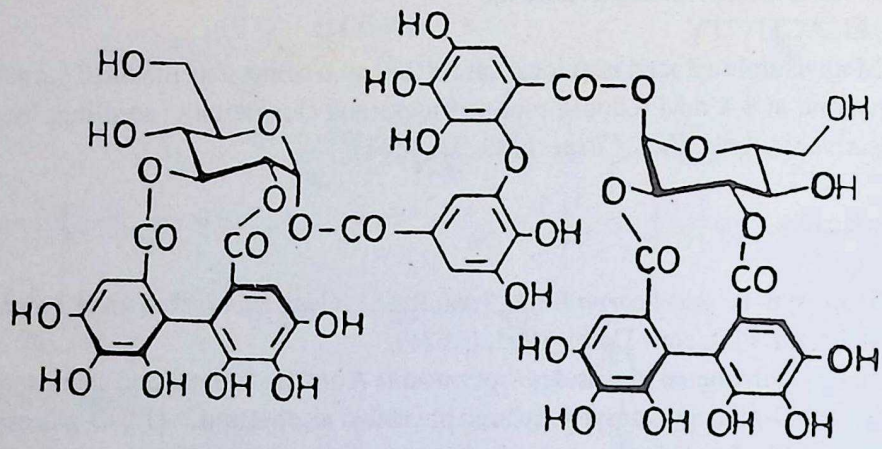
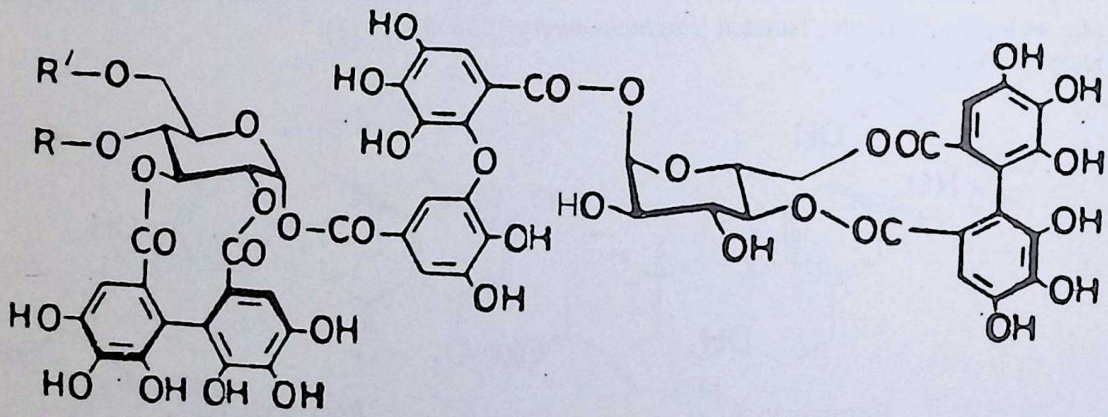


Laevigatin E



Laevigatin F
RR' = (S)Hexahydroxy-diphenoyl
Laevigatin G
R,R'= H

R. microcarpa Lindl.; see *R. cymosa* Tratt.

R. multiflora Thunb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 554).

Butanol-soluble fraction of methanolic extract showed purgative activity in mice (*Chem. Pharm. Bull.* 1992, *40,* 2080).

Isolation and structure elucidation of a new purgative compound - multinoside A acetate - from fruits; quercetin-3-O-xyloside, isoquercitrin and hyperin also isolated (*Chem. Pharm. Bull.* 1992, *40,* 2080); eugenol (22.8), phenylethanol (18.1) and heneicosane (10.2%) determined in floral absolute oil by GC-MS (*Gaodeng Xuexiao Huaxue Xuebao* 1991, *12,* 1072; *Chem. Abstr.* 1992, *116,* 91118 x).

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BIOLOGICAL ACTIVITY

Multinoside A acetate showed purgative activity in mice, ED50 value 150.0 mg/kg (*Chem. Pharm. Bull.* 1992, *40,* 2080).

R. sinica Ait.; see *R. laevigata* Michx.

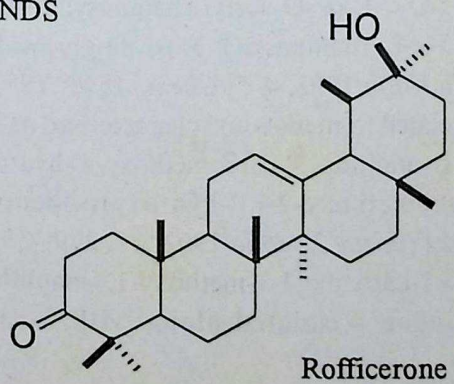
ROSMARINUS (Lamiaceae)

R. officinalis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 639).

Leaf extract strongly inhibited lipid oxidation and soybean lipoxygenase activity (*J. Am. Oil Chemists Soc.* 1992, *69,* 999; *Chem. Abstr.* 1992, *117,* 245570 y); essential oil showed appreciable antibacterial activity against *Staphylococcus aureus* and *S. pyrogenes* (*Fitoterapia* 1994, *65,* 279).

Myrcene (17.9-20.4), β-caryophyllene (14.5-15.3), 1,8-cineole (14.5-15.3), camphor (9.0-9.3) and α-pinene (7.9-10.9%) determined in oil from plants grown in two different zones of Argentina (Sumalao and Castelar); highest yield of oil was found in Sumalao plants (*J. Essent. Oil Res.* 1991, *3,* 11; *Chem. Abstr.* 1991, *114,* 192224 t); rosmanol, epirosmanol, 7-methyl-epirosmanol, carnosol, ursolic acid and carnosic acid isolated from leaves (*Huaxue Tongbao* 1992, 30; *Chem. Abstr.* 1992, *117,* 4264 w; *J. Am. Oil Chemists Soc.* 1992, *69,* 999; *Chem. Abstr.* 1992, *117,* 245570 y; *Z. Lebensm.-Unters. Forsch.* 1992, *195,* 99; *Chem. Abstr.* 1993, *119,* 4924 c); isolation and structure elucidation of a new triterpenoid - rofficerone - from aerial parts, 3-O-acetyloleanolic acid, 3-O-acetylursolic acid, and α- and β-amyrenones also isolated (*Planta Med.* 1993, *59,* 276); tannin (5.5%) and caffeic, chlorogenic and rosmarinic acids identified (*Bull. Fac. Pharm.,* Cairo Univ. 1993, *31,* 237; *Chem. Abstr.* 1994, *120,* 212569 p); α-pinene, 1,8-cineole, camphor and bornyl acetate determined in essential oil of Spanish, French and Moroccan origin (*J. Essent. Oil Res.* 1993, *5,* 613; *Chem. Abstr.* 1994, *121,* 42382 y); determination of verbenone (12.3), camphor (11.3), bornyl acetate (7.6) and limonene (7.1%) in essential oil (0.14%) of leaves of plant collected from Sinai (Egypt); camphor (14.9), α-pinene (9.3) and 1,8-cineole (9.0%) determined in essential oil (0.40%) of leaves of plant collected from Giza (Egypt) (*Flavour Fragrance J.* 1994, *9,* 29; *Chem. Abstr.* 1994, *120,* 330918 z).

NEW COMPOUNDS



Rofficerone

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BIOLOGICAL ACTIVITY

Rosmanol (0.02%) showed antioxidant activity in oxidation of fatty acids (*Huaxue Tongbao* 1992, 30; *Chem. Abstr.* 1992, *117,* 4264 w); carnosol and carnosic acid are powerful inhibitors of lipid peroxidation in microsomal and liposomal systems, more effective than propyl gallate. Both are good scavengers of peroxyl radicals generated by pulse and radiolysis (*Xenobiotica* 1992, *22,* 257; *Chem. Abstr.* 1992, *116,* 182576 x).

RUBIA (Rubiaceae)

R. cordifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 641).

Isolation of 2-carbomethoxy-3-(3'-hydroxy)isopentyl-1,4-naphthohydroquinone-4-O-β-D-glucoside, 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-β-D-glucoside, 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-α-L-(3'-O-acetyl)rhamnosyl(1→2)-β-D-glucoside, 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-α-L-(3',6'-O-diacetyl)rhamnosyl(1→2)-β-D-glucoside, 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-α-L-(4',6'-O-diacetyl)-rhamnosyl(1→2)-β-D-glucoside and dihydromollugin from roots (*Phytochemistry* 1989, *28,* 3465); a new anthraquinone isolated from roots and characterised as 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-α-L-rhamnosyl(1→2)-β-D-glucoside; in addition, 2-methyl-1-hydroxy-9,10-anthraquinone, 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-α-L-(6'-O-acetyl)-rhamnosyl(1→2)-β-D-glucoside, 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-β-D-(6'-O-acetyl)glucoside, 2-carbomethoxy-3-prenyl-1,4-naphthohydroquinone-di-β-D-glucoside, rubimallin, alizarin, daucosterol and β-sitosterol isolated (*Yaoxue Xuebao* 1990, *25,* 834; *Chem. Abstr.* 1991, *114,* 108761 k); isolation and structure elucidation of a new anthraquinone glycoside - 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-β-D-xylosyl(1→2)-β-D-(6'-O-acetyl)-glucoside - from roots; 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone-3-O-β-D-glucoside, 1,2-dihydroxy-9,10-anthraquinone-2-O-β-D-xylosyl(1→6)-β-D-glucoside, 1,3-dihydroxy-2-hydroxymethyl-9,10-anthraquinone-3-O-β-D-xylosyl(1→6)-β-D-glucoside, 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone, 1-hydroxy-9,10-anthraquinone and 1,2,4-trihydroxy-9,10-anthraquinone also isolated (*Shenyang Yaoxueyuan Xuebao* 1991, *8,* 211; *Chem. Abstr.* 1992, *116,* 148196 c; *Yaoxue Xuebao* 1992, *27,* 743; *Chem. Abstr.* 1993, *118,* 165181 c); determination of 2-methyl-1,6-dihydroxyanthraquinone-3-O-α-L-(6'-O-acetyl)rhamnosyl(1→2)-β-D-glucoside, 2-methyl-1,6-dihydroxyanthraquinone-3-O-α-L- rhamnosyl(1→2)-β-D-glucoside and ruberythric acid by HPLC (*Tianran Chanwu Yanjiu Yu Kaifa* 1992, *4,* 5; *Chem. Abstr.* 1993, *118,* 35959 b); a new naphthoic acid ester - rubilactone - isolated from roots and characterised as 3'-carbomethoxy-4'-hydroxynaphtho[1',2'-2,3]pyran-6-one; in addition, 3'-carbomethoxy-4'-hydroxynaphtho[1',2'-2,3]furan, dihydromollugin and 3-carbomethoxy-2-(3'-hydroxy)isopentyl-1,4-naphtho-hydroquinone-1-O-β-D-glucoside isolated (*Yaoxue Xuebao* 1992, *27,* 279; *Chem. Abstr.* 1992, *117,* 44582 e); two new naphthoquinones - 2-carbamoyl-3-methoxy-1,4-naphthoquinone and 2-carbamoyl-3-hydroxy-1,4-naphthoquinone - isolated along with 3-carbomethoxy-1-

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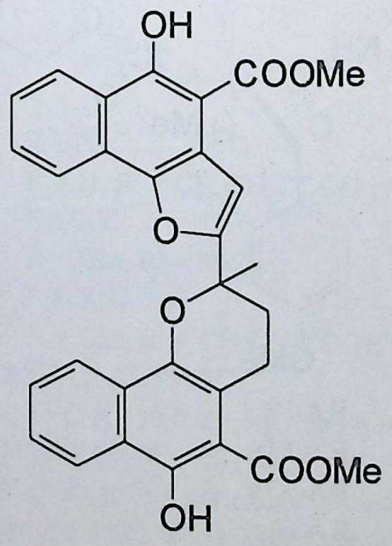
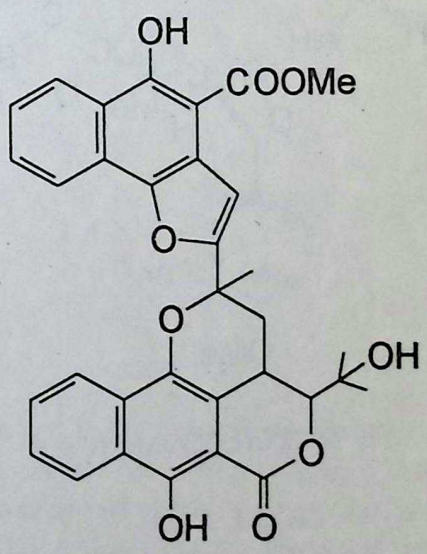
hydroxyanthraquinone, 1,4-dihydroxy-2-methylanthraquinone, 1-hydroxy-2-methylanthraquinone, 1-hydroxy-2-hydroxymethyl anthraquinone, 1,3-dihydroxyanthraquinone and tectoquinone (*Phytochemistry* 1992, *31,* 2907); two new naphthohydroquinone dimers (I and II) and four new naphthohydroquinones - 2'-methoxymollugin, 2'-hydroxymollugin, 1'-methoxy-2'-hydroxydihydromollugin and 1',2'-dihydroxydihydromollugin - isolated from roots and their structures established; mollugin, 2-carboxymethyl-3-prenyl-2,3-epoxy-1,4-naphthoquinone, 1-hydroxy-2-hydroxymethyl-9,10-anthraquinone, 2-methyl-1,3,6-trihydroxy-9,10-anthraquinone and rubioncolin B also isolated (*Chem. Pharm. Bull.* 1993, *41,* 1869); isolation and structure determination of a new iridoid glycoside - 6-methoxygeniposidic acid - from roots (*Phytochemistry* 1991, *30,* 1710; *Shenyang Yaoxueyuan Xuebao* 1991, *8,* 58; *Chem. Abstr.* 1991, *115,* 25980 a); two macrocyclic neoplasm inhibitors - TPC-A and TPC-B - isolated and found identical to RA-V and RA-VII respectively (Jpn. 1,230,599 (1989) Sep. 14; *Chem. Abstr.* 1990, *112,* 240475 h); bicyclic hexapeptides - (III), RA-VI and RA-VIII - obtained from roots and their structures established and conformation-activity relationship determined (*Tetrahedron* 1991, *47,* 7007; Jpn. 5,32,698 (1993) Feb. 09; *Chem. Abstr.* 1993, *119,* 56135 r); isolation of two more cyclic hexapeptides - RA-IX and RA-X - from roots and their characterisation (*J. Chem. Soc.* Perkin 1 1992, 455; Jpn. 5,32,698 (1993) Feb. 09; *Chem. Abstr.* 1993, *119,* 56135 r); isolation and structure determination of four hexapeptides, RA-XI, RA-XII, RA-XIII and RA-XIV (*Chem. Pharm. Bull.* 1992, *40,* 1352); two more antitumor bicyclic hexapeptides - RA-XV and RA-XVI - isolated and their structures established (*Phytochemistry* 1993, *33,* 613).

NEW COMPOUNDS



I



II

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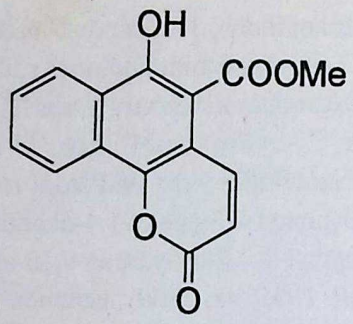
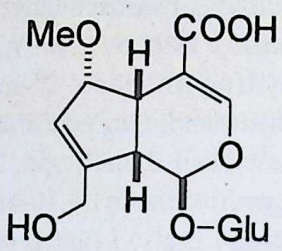
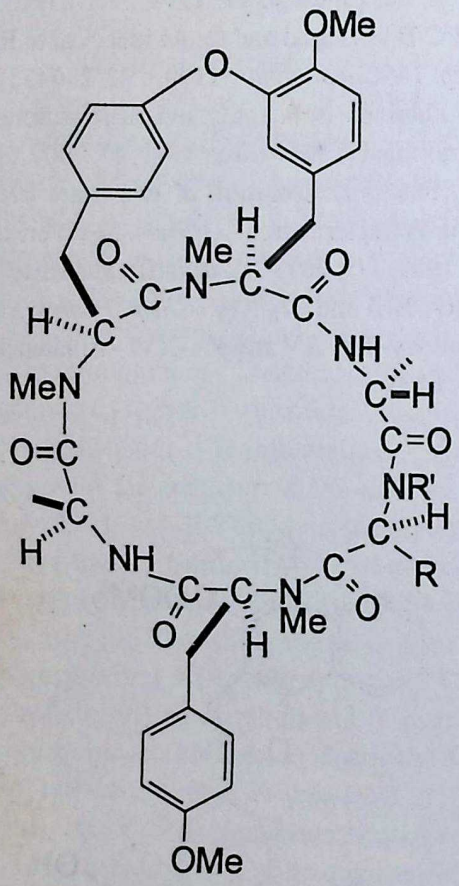


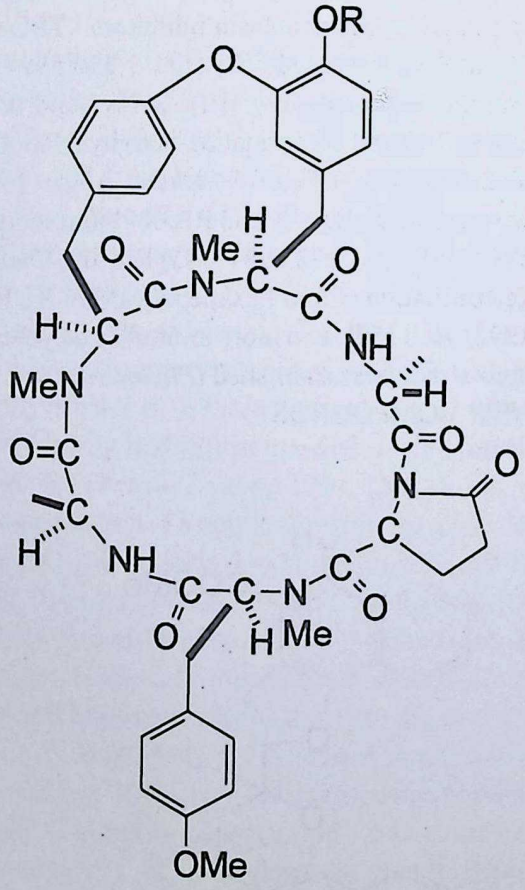
Rubilactone



6-Methoxygeniposidic acid



III
R = CH_2CH_2COOMe, R' = H
RA-VI
R = CH_2OH, R' = H
RA-VIII
R = CH(OH)Me, R' = H
RA-X
R = CH_2CH_2COOH, R' = H



RA-IX
R = Me
RA-XIV
R = Glu

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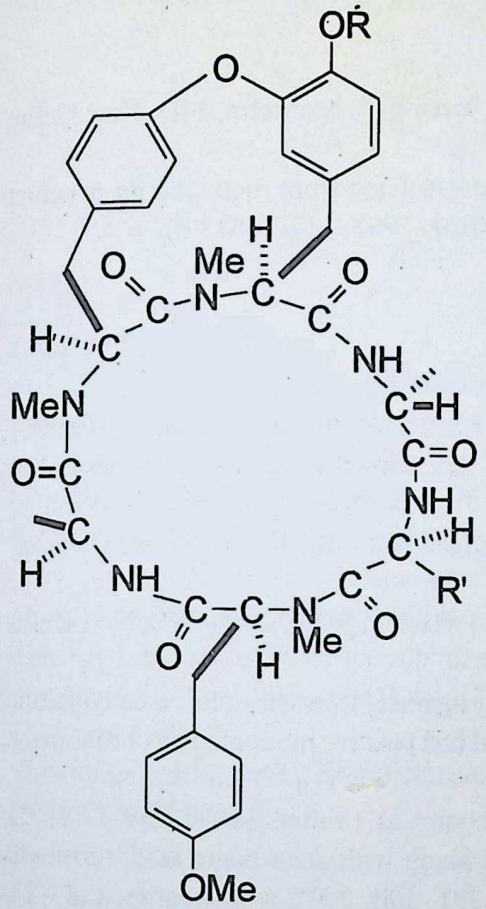

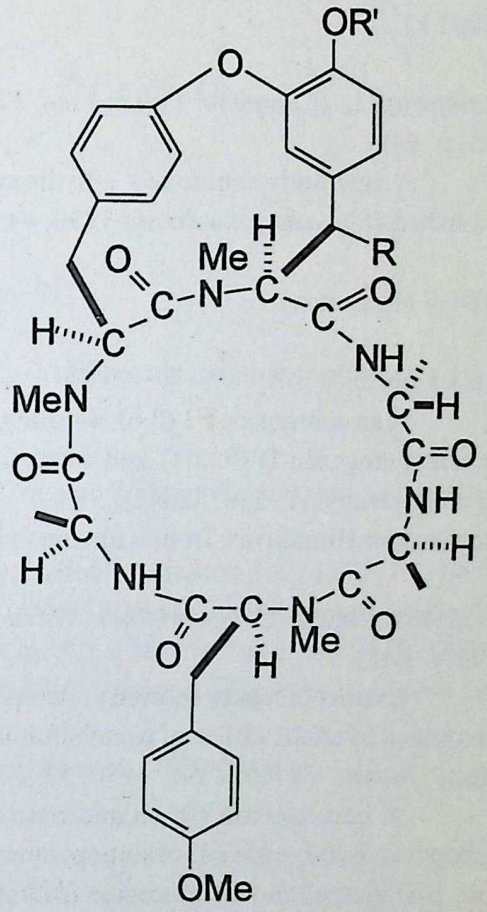

RA-XI
R = H, R' = CH_2CH_2COOH
RA-XII
R = Glu, R' = Me
RA-XIII
R = Glu, R' = CH_2CH_2COOH

RA-XV
R = H, R' = Glu(6-Ac)
RA-XVI
R = OAc, R' = Glu

BIOLOGICAL ACTIVITY

TPC-A (10.0 mg/kg, i.p.) administered to tumor cell P-388 bearing mice prolonged their life span by 187.4% (Jpn. 1,230,599 (1989) Sep. 14; *Chem. Abstr.* 1990, *112,* 240475 h); RA-X showed strong antitumor activity whereas RA-IX was devoid of such activity (*J. Chem. Soc.* Perkin 1 1992, 455); cyclic peptides RA-VI, RA-VIII, RA-IX, RA-X and its methyl ester (III) showed IC50 of 0.035, 0.031, 0.092, 0.180 and 0.050 μg/ml respectively against mouse leukaemia P-388 cells whereas TPC-B showed IC50 of 1.40 ng/ml (Jpn. 5,32,698 (1993) Feb. 09; *Chem. Abstr.* 1993, *119,* 56135 r); bicyclic hexapeptides RA-XI, RA-XII, RA-XIII and RA-

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XIV exhibited potent antitumor activity against P-388 (*Chem. Pharm. Bull.* 1992, *40,* 1352); rubimallin showed antibacterial activity (*Yaoxue Xuebao* 1990, *25,* 834; *Chem. Abstr.* 1991, *114,* 108761 k).

R. tinctorum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 642).

A new anthraquinone - 7-hydroxytectoquinone - isolated from roots and its structure established (*Shoyakugaku Zasshi* 1990, *44,* 95; *Chem. Abstr.* 1991, *114,* 78643 d).

RUBUS (Rosaceae)

R. acuminatus Smith

Niga-ichigoside F1 (0.6), 4-epiniga-ichigoside F1 (0.026), trachelosperoside B (0.086), trachelosperogenin B (0.004) and sericoside (0.006%) determined in leaves of Chinese plant (*Phytochemistry* 1992, *31,* 3642).

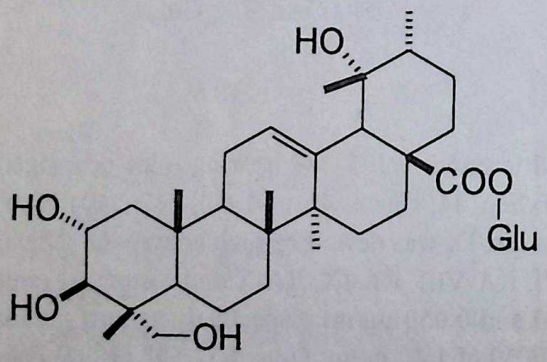
Distribution: Himalayas, from Kumaon to Bhutan and Khasi Hills, alt. 1000-2300 m.

R. ellipticus Smith (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 643).

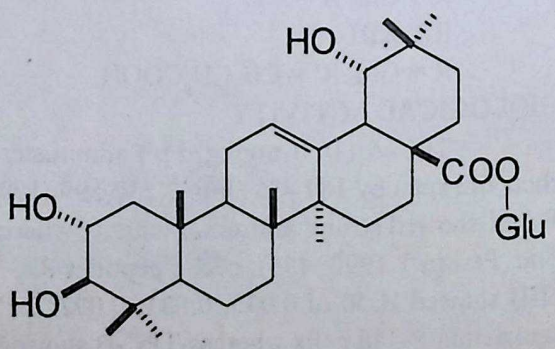
Extract of leaves showed anticonvulsant activity against electrical-induced convulsions, potentiated hypnotic efffect of pentobarbitone sodium and had positive inotropic and chronotropic effects (*Indian J. Pharm. Sci.* 1990, *52,* 174).

A new saponin (I), characterised as 3β-hydroxyurs-12,18-dien-28-oic acid-3-O-β-D-glucopyranosyl(1→4)-α-L-arabinopyranoside, isolated along with acuminatic acid, tormentic acid, β-sitosterol and its glucoside (*Indian J. Chem.* 1991, *30*B, 292); a new compound - 24-deoxysericoside - isolated from leaves of Chinese plant and its structure determined; in addition niga-ichigoside F1, sericoside, glucosyl tormentate, kaji-ichigoside F1 also isolated (*Phytochemistry* 1992, *31,* 3642).

NEW COMPOUNDS



Niga-ichigoside F1



24-Deoxysericoside

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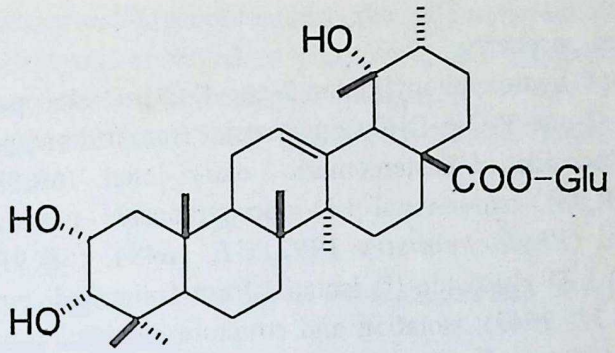


Kaji-ichigoside F1

BIOLOGICAL ACTIVITY

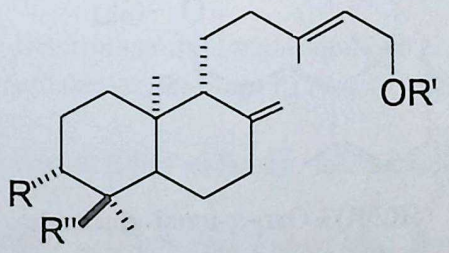
Saponin (I) showed anti-implantation activity in rats but not in hamsters (*Indian J. Chem.* 1991, *30*B, 292).

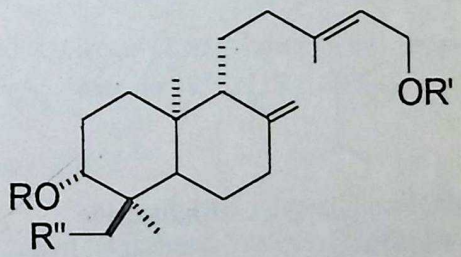
R. foliolosus D.Don syn. *R. pedunculosus* D.Don, *R. niveus* Wall. ex G.Don var. *pedunculosus* (D.Don) Hook.f.

Isolation of new labdane-type diterpene glycosides - goshonosides F1, F2, F3, F4, F5, F6 and F7 - from fruits; characterisation of F6 and F7 as 18-O-α-L-arabinofuranosyl(1→6)-β-D-glucopyranoside of 13(E)ent-labda-8(17),13-dien-3β,15,18-triol and 3β,15-di-O-β-D-glucopyranoside of 13(E)ent-labda-8(17),13-dien-3β,15-diol respectively (*Chem. Pharm. Bull.* 1991, *39*, 2443).

Distribution: Himalayas, from Himachal Pradesh to Sikkim, alt. 1500-2400 m.

NEW COMPOUNDS





Goshonoside F1
R = OH, R' = Glu, R'' = CH_2OH
Goshonoside F2
R = OH, R' = H, R'' = CH_2O-Glu
Goshonoside F3
R = H, R' = Glu, R'' = COO-Glu
Goshonoside F4
R = H, R' = Glu, R'' = CH_2O-Glu
Goshonoside F5
R = OH, R' = Glu, R'' = CH_2O-Glu

Goshonoside F6
R,R' = H, R'' = O-Glu(6→1)Ara
Goshonoside F7
R,R' = Glu, R'' = H

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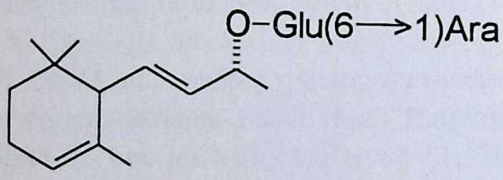
R. idaeus L.

Eng. - European raspberry.

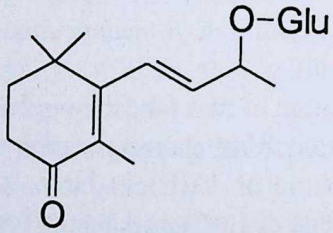
Isolation of 4-(4'-hydroxyphenyl)butan-2-one-4'-O-β-D-glucopyranoside and 4-(3',4'-dihydroxyphenyl)butan-2-one-3'-O-β-D-glucopyranoside from fruits (*Phytochemistry* 1990, *29*, 3853); two 3'-O-β-D-glucosides of diastereomeric 3-oxo-α-ionol - (6R,9R)3-oxo-α-ionol-β-D-glucopyranoside and (6R,9S)3-oxo-α-ionol-β-D-glucopyranoside - isolated from fruits and their structures determined (*Phytochemistry* 1992, *31*, 1649); (6R,9R)α-ionol-9-O-α-L-arabinofuranosyl(1→6)-β-D-glucoside (I) isolated from fruits and its structure established (*Phytochemistry* 1992, *31*, 2043); isolation and structure elucidation of 4-oxo-β-ionol-β-D-glucopyranoside and (S)(+)linalool-α-L-arabinofuranosyl(1→6)-β-D-glucopyranoside from fruits (*Phytochemistry* 1992, *31*, 4187).

Distribution: Native of Europe, cultivated in hill stations of south India.

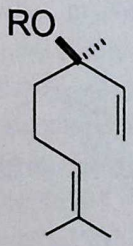
NEW COMPOUNDS



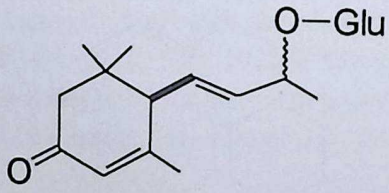
I



4-Oxo-β-ionol-glucoside



(S)(+)Linalool-arabinosyl(1→6)glucoside
R = Glu(6→1)Ara



(6R,9R)3-Oxo-α-ionol-glucoside
~~ = α
(6R,9S)3-Oxo-α-ionol-glucoside
~~ = β

R. niveus Wall. ex G.Don var. *pedunculosus* (D.Don) Hook.f.; see *R. foliolosus* D.Don

R. pedunculosus D.Don; see *R. foliolosus* D.Don

RUDBECKIA (Asteraceae)

R. bicolor Nutt. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 594).

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Methanolic extract and flavonoid fraction showed immunomodulating activity in mice. Immunostimulatory effect was observed on phagocytic activity of peritoneal macrophages. Methanolic extract also seemed to increase spleen weight.

Eupalin and eupatolin identified in flavonoid fraction (*Fitoterapia* 1994, *65,* 131).

RUGELIA (Asteraceae)

R. nudicaulis Schuttlew. ex Chapm.; see *Senecio nudicaulis* Buch.-Ham. ex D.Don

RUMEX (Polygonaceae)

R. acetosa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 644).

Three new C-glycosides - 2",6"-di-O-acetylorientin, 2"-O-acetylisoorientin and 2",6"-di-O-acetylisoorientin - isolated from aerial parts along with 2"-O-acetylorientin, isoorientin, orientin, hyperin and avicularin (*Chem. Pharm. Bull.* 1990, *38,* 2277).

R. chalepensis Mill. syn. *R. dictyocarpus* Boiss. & Bushe (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 559).

Emodin, chrysophanol, quercetin and quercitrin isolated (*Xi'an Yike Daxue Xuebao* 1990, *11,* 346; *Chem. Abstr.* 1991, *115,* 46088 f).

R. crispus L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 559).

Determination of anthraquinone glycosides in roots (2.93), stems (0.08), leaves (0.21) and fruits (0.08%) (*Pharmazie* 1994, *49,* 378; *Chem. Abstr.* 1994, *121,* 31173 e).

R. dictyocarpus Boiss. & Bushe; see *R. chalepensis* Mill.

R. maritimus L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 353).

Chrysophanol, 7-hydroxy-2,3-dimethylchromone, kaempferol and quercetin isolated (*Pharmazie* 1991, *46,* 548; *Chem. Abstr.* 1992, *116,* 102725 w).

R. spinosus L.; see *Emex spinosa* (L.) Campd.

RUTA (Rutaceae)

R. angustifolia Pers.; see *R. chalepensis* L.

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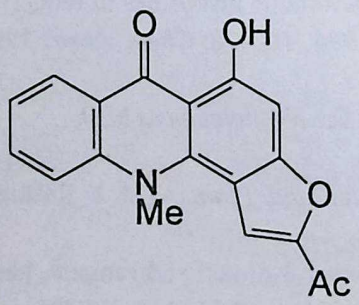
R. chalepensis L. syn. *R. graveolens* L. var. *angustifolia* (Pers.) Hook.f., *R. angustifolia* Pers. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 645).

Crystal structure of angustifolin determined (*Acta Crystallogr., Cryst. Struct. Commun.* 1990, *46*C, 2482; *Chem. Abstr.* 1991, *114,* 101424 u); a new olefinic derivative - 8-(3,4-methylenedioxyphenyl)oct-1-ene - along with piperonylacetone identified in essential oil of Malaysian plant (*J. Essent. Oil Res.* 1991, *3,* 355; *Chem. Abstr.* 1992, *116,* 91114 t); isotaifine synthesised (*Huaxue* 1990, *48,* 309; *Chem. Abstr.* 1992, *116,* 174486 s).

R. graveolens L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 646).

Determination of 2-undecanone (30.73), 2-nonanone (18.06), 2-nonyl acetate (11.03), psoralen (1.28) and bergapten and xanthotoxin (7.24%) in oil (82.0%) obtained from Malaysian plant (*J. Essent. Oil Res.* 1989, *1,* 203; *Chem. Abstr.* 1990, *113,* 65123 p); a new acridone alkaloid - hallacridone - isolated from callus and suspension cultures and its structure determined; 1-hydroxy-N-methyl acridone and its 3-methoxyderivative, rutacridone, rutacridone epoxide, gravacridone-chlorine, dictamnine, γ-fagarine, skimmianine, bergapten and isopimpinellin also isolated (*Fitoterapia* 1988, *59,* 83); structure of hallacridone revised by synthesis (*J. Chem. Soc.* Perkin 1 1989, 1047); synthesis of 3-(1,1-dimethylallyl)-8-(3,3-dimethylallyl)xanthyletin (*Heterocycles* 1990, *31,* 255); rutacridone synthesised (*Monatsh. Chem.* 1990, *121,* 829; *Chem. Abstr.* 1991, *114,* 82213 f); synthesis of gravacridonol (*Ann. Chem.* 1991, 299); a new dihydrofuroacridone alkaloid - gravacridonediol acetate - isolated from roots and structure determined; rutacridone, rutacridone epoxide, gravacridonetriol, gravacridonediol and 1-hydroxy-10-methylacridin-9(10H)-one also isolated (*Planta Med.* 1991, *57,* 82).

NEW COMPOUNDS



Hallacridone

R. graveolens L. var. *angustifolia* (Pers.) Hook.f.; see *R. chalepensis* L.

SACCHARUM (Poaceae)

S. officinarum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 647).

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An aromatic ester glycoside isolated from roots and characterised as vanilloyl-1-O-β-D-glucoside acetate (*Indian J. Chem.* 1989, *28*B, 875).

SAGENIA (Aspidiaceae)

S. subtriphylla Bedd.; see *Tectaria subtriphylla* (Hook. & Arn.) Copel.

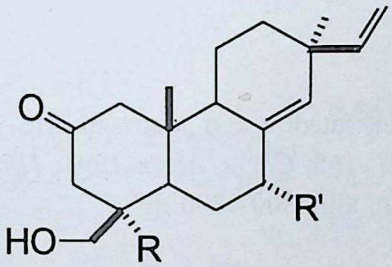
SAGITTARIA (Alismataceae)

S. sagittifolia L.; see *S. trifolia* L.

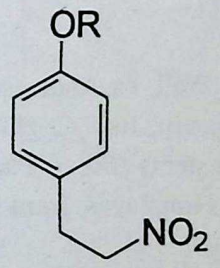
S. trifolia L. syn. *S. sagittifolia* sensu Hook.f. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 647).

Four new diterpenes - trifoliones A, B, C and D - and three new glycosides - sagittariosides a and b and arabinothalictoside - isolated from tuber and their stereostructures determined (*Chem. Pharm. Bull.* 1993, *41,* 1677).

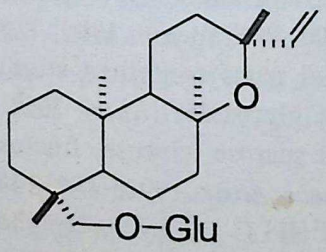
NEW COMPOUNDS



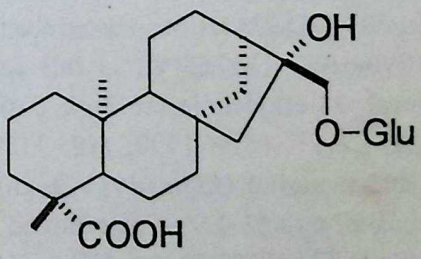
Trifolione A
R = Me, R' = H
Trifolione B
R = Me, R' = OH
Trifolione C
R = CH_2OH, R' = H
Trifolione D
R = CH_2OH, R' = OH



Arabinothalictoside



Sagittarioside a



Sagittarioside b

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BIOLOGICAL ACTIVITY

Trifoliones A, B, C and D inhibited histamine release from rat mast cells induced by calcium ionophore A-23187 (*Chem. Pharm. Bull.* 1993, *41,* 1677).

Note: The current nomenclatural status of the *S. sagittifolia* of Indian flora is provided above.

SALIX (Salicaceae)

S. caprea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 648).

Salicin, saligenin, gallocatechin, rutin, cynaroside, quercetin and luteolin obtained from leaves (*Khim. Prir. Soedin.* 1990, 119; *Chem. Abstr.* 1990, *112,* 213913 t).

BIOLOGICAL ACTIVITY

In acute gastric ulcer (cold-restraint and phylorusligated models) in rats, quercetin and naringenin caused significant decrease in ulcer index compared to control group. However, in Shayligated method no decrease in either volume acidity or pepsin was observed but there was significant difference in histamine secretion (*Phytother. Res.* 1993, *7,* 150; *Chem. Abstr.* 1993, *119,* 20259 v).

S. lindleyana Wall. ex Andr. var. *lindleyana*

Apigenin, its 7-O-glucoside, kaempferol, luteolin and saturated C15-31 fatty acids isolated from stems (*Int. J. Pharmacog.* 1993, *31,* 165; *Chem. Abstr.* 1993, *119,* 156225 p).

Distribution: Himalayas, from Kashmir to Sikkim, alt. 3300-4800 m.

SALMALIA (Bombacaceae)

S. malabarica (DC.) Schott. & Endl.; see *Bombax ceiba* L.

SALSOLA (Chenopodiaceae)

S. collina C.A.Mey. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 649).

Narcissin, isorhamnetin and its 3-O-glucoside, tricin and its 7-O-glucoside and quercetin-3-O-β-D-glucoside isolated from aerial parts (*Khim. Prir. Soedin.* 1989, 725; *Chem. Abstr.* 1990, *112,* 115755 y); at full seed ripening aerial parts contained stigmasterol, campesterol, 24-ethylcholestan-3-ol, β-sitosterol and their glycosides (*Khim. Prir. Soedin.* 1989, 731; *Chem. Abstr.* 1990, *112,* 73890 f); isolation of sucrose, glucose, fructose, myo-inositol and mannitol (*Khim. Prir. Soedin.* 1991, 420; *Chem. Abstr.* 1992, *116,* 148242 q); glycine betanine (0.51-1.9%) determined in aerial parts by HPLC and by spectrophotometry (*Khim.-Farm. Zh.* 1992, *26,* 94; *Chem. Abstr.* 1993, *119,* 56300 r).

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SALVADORA (Salvadoraceae)

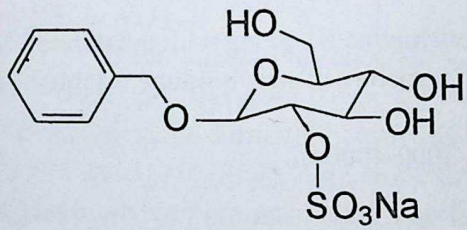
S. indica Wight; see *S. persica* L. var. *wightiana* (Planch. ex Thw.) Verdc.

S. persica L.; see *S. persica* L. var. *wightiana* (Planch. ex Thw.) Verdc.

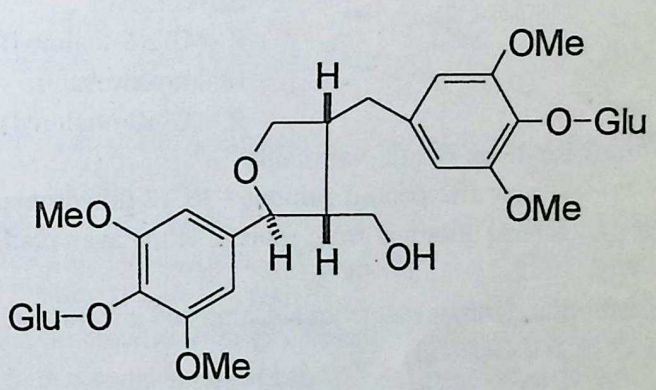
S. persica L. var. *wightiana* (Planch. ex Thw.) Verdc. syn. *S. indica* Wight, *S. persica* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 649).

Two new glycosides - salvadoside and salvadoraside - isolated from stems and characterised as sodium 1-O-benzyl-β-D-glucoside-2-sulphate and 5,5'-dimethoxylariciresinol-4,4'-bis-O-β-D-glucoside respectively; syringin, liriodendrin and sitosterol-3-O-glucoside also isolated (*Phytochemistry* 1992, *31,* 2469).

NEW COMPOUNDS



Salvadoside



Salvadoraside

SALVIA (Lamiaceae)

S. coccinea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 649).

Essential oil from plant from same location in Nigeria analysed by GC-MS in three consecutive years; acenaphthene (18.0), trans-hex-2-enal (11.0) and globulol (11.0%) as major components determined in 1987; globulol (65.0) and aromadendrene (11.0%) in 1988; whereas 2,5-dimethoxy-p-cymene (29.0) and globulol (16.5%) in 1989 (*Flavour Fragrance J.* 1991, *6,* 281; *Chem. Abstr.* 1992, *116,* 158676 y).

S. farinacea Benth. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 649).

Blue flowers of plant yielded salviamalvin and malonylawobanin whose structures determined (*Tetrahedron Lett.* 1989, *30,* 6729); kaempferol, isorhamnetin, isorhamnetin-3-O-

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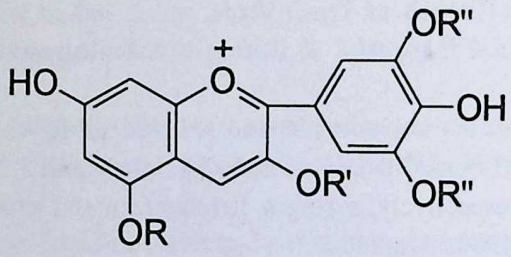
β-D-galactoside, kaempferol-3-O-robinobioside, isorhamnetin-3-O-rhamnosyl(1→6)-[rhamnosyl(1→2)]-glucoside and kaempferol-3-O-rhamnosyl(1→6)-[rhamnosyl(1→2)]-glucoside isolated from leaves (*Bull. Fac. Pharm.*, Cairo Univ. 1992, *30*, 259; *Chem. Abstr.* 1993, *119*, 156237 u).

NEW COMPOUNDS



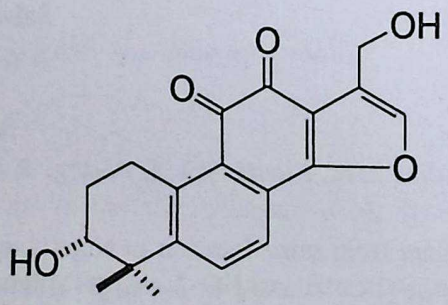
Salviamalvin
R = Glu(6-malonyl), R' = Glu(6-p-coumaroyl), R" = Me
Malonylawobanin
R = Glu(6-malonyl), R' = Glu(6-p-coumaroyl), R" = H

S. hians Royle ex Benth. var. *hians*

A new diterpenoid quinone - 3α,17-dihydroxytanshinone II - along with tanshinone II and β-sitosterol obtained from roots of Himalayan plant; structure of new quinone established (*J. Nat. Prod.* 1992, *55*, 947).

Distribution: Himalayas, from Kashmir to Garhwal, alt. 3000-4000 m.

NEW COMPOUNDS



3α,17-Dihydroxytanshinone II

S. lanata Roxb.; see *S. mukerjeea* Bennet & Raizada

S. leucantha Cav. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 650).

A new triterpene - salvitriol - isolated and its structure determined (*J. Indian Chem. Soc.* 1992, *69*, 410); isolation of a new neo-clerodane diterpenoid - salvileucantholide - from

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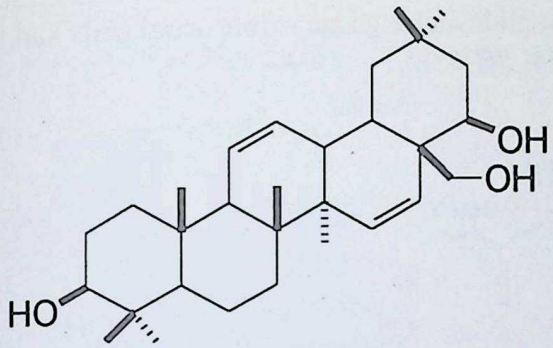
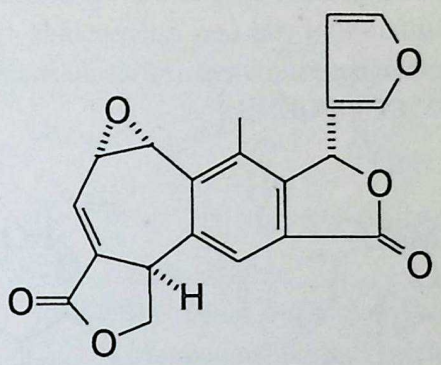
aerial parts along with salviandulin E and salvifaricin; crystal structure of new compound determined (*Tetrahedron* 1994, *50,* 11593).

NEW COMPOUNDS



Salvitriol



Salvileucantholide

S. mukerjeea Bennet & Raizada syn. *S. lanata* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 651).

Synthesis of royleanone (*Tetrahedron Lett.* 1990, *31,* 3723).

S. officinalis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mchrotra, PID, New Delhi, 1995, p. 651).

Sage oil showed moderate activity against bacteria, activity being more against Gram +ve bacteria (MIC 2.5-5.0 μg/cm^3) than Gram -ve bacteria (MIC 7.5 μg/cm^3). It also inhibited development of dermatophytes (MIC 7.5-100.0 μg/cm^3) (*Herba Pol.* 1990, *36,* 155; *Chem. Abstr.* 1992, *116,* 158678 a); leaf extract inhibited tert-butylbicyclophosphorothionate binding to rat brain membrains *in vitro.* This ligand is considered to bind to chloride channel of GABA/ benzodiazepine receptor complex in brain tissue; carnosic acid and carnosol isolated as active components (IC50 33.0 and 57.0 μM respectively) (*Neurosci. Lett.* 1992, *135,* 224; *Chem. Abstr.* 1992, *116,* 187870 n).

7-Ethylrosmanol, cirsimaritin, luteolin-7-O-glucoside, apigenin-7-O-glucoside, ursolic acid, oleanolic acid, β-sitosterol and saccharose obtained from leaves (*Chem. Pap.* 1989, *43,* 797; *Chem. Abstr.* 1990, *112,* 73917 u); lithospermic acid and salvianolic acid A isolated from roots (Jpn. 2,131,423 (1990) May 21; *Chem. Abstr.* 1991, *114,* 69040 c); thujone (53.1), camphor (14.8), cineole (7.3), β-caryophyllene (6.6%), borneol, borneol acetate, camphane, α-humulene, α- and β-pinenes, limonene, p-cymene, linalool and β-myrcene identified (*Herba Pol.* 1990, *36,* 155; *Chem. Abstr.* 1992, *116,* 158678 a); identification of 1,8-cineole and camphor in leaves by GC (*Khim.-Farm. Zh.* 1991, *25,* 58; *Chem. Abstr.* 1991, *115,* 15703 y); 12-methoxy-8,11,13-abietatrien-20,11-olide and 12-O-methylcarnosic acid-γ-lactone from aerial parts and their structures established by X-ray analysis; 7-ethylrosmanol, manool and oleanolic acid also isolated (*Phytochemistry* 1992, *31,* 1307); crystal structure of galdosol-11-methyl ether determined by X-ray analysis (*J. Crystallogr. Spectrosc. Res.* 1992, *22,* 585; *Chem. Abstr.* 1993, *118,* 7217 g); carnosic acid, carnosol, rosmadial, rosmanol, epirosmanol,

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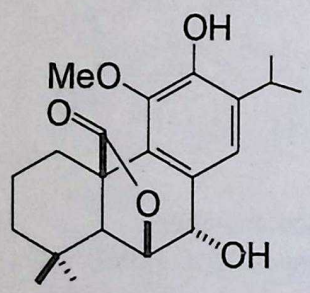
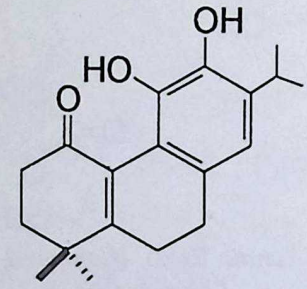
7-methylepirosmanol and methyl carnosate as antioxidant constituents identified by HPLC (*Z. Lebensm.-Unters. Forsch.* 1992, *195*, 99; *Chem. Abstr.* 1993, *119*, 4924 c; *J. Agric. Food Chem.* 1994, *42*, 665; *Chem. Abstr.* 1994, *120*, 162146 a); 12-deoxocarnosol from aerial parts of wild sage from Dalmatia (*J. Serb. Chem. Soc.* 1994, *59*, 291; *Chem. Abstr.* 1994, *121*, 226366 c); isolation of two new diterpenoids - safficinolide and sageone - from aerial parts and their structure determination (*Phytochemistry* 1994, *35*, 539).

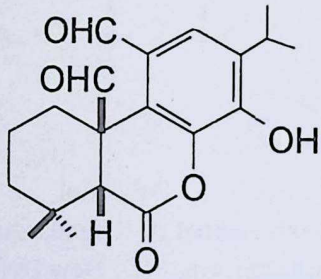
NEW COMPOUNDS



Galdosol-11-methylether



Sageone



Safficinolide

BIOLOGICAL ACTIVITY

Lithospermic acid and salvianolic acid A exhibited inhibitory activity against 5-lipoxygenase with IC50 0.14 and 0.38 μM respectively; LD50 values of above compounds given orally to mice were around 0.3 g/kg (Jpn. 2,131,423 (1990) May 21; *Chem. Abstr.* 1991, *114*, 69040 c); thujone, camphor and cineole showed moderate activity whereas borneol, linalool and p-cymene showed strong activity against bacteria and fungi (*Herba Pol.* 1990, *36*, 155; *Chem. Abstr.* 1992, *116*, 158678 a); carnosol, carnosic acid, rosmadial, rosmanol, epirosmanol and methyl carnosate showed strong antioxidant activity (*J. Agric. Food Chem.* 1994, *42*, 665; *Chem. Abstr.* 1994, *120*, 162146 a).

S. patens Cav.

A pigment complex - protodelphin - isolated from blue flowers and shown to be composed of delphinidin-3-O-(6"-p-coumaroyl)glucoside-5-O-(6"-malonyl)lglucoside, apigenin-7,4'-di-O-glucoside and magnesium (*Phytochemistry* 1994, *35*, 1167).

Distribution: Introduced into Indian gardens.

S. splendens Ker-Gawl. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 652).

Salvianin and its demalonyl derivatives along with monardaein and its demalonyl derivatives isolated from scarlet flowers whereas salviadelphin, its demalonyl derivatives and 4",6"-dimalonylawobanin from purple flowers of plant (*Tetrahedron Lett.* 1989, *30*, 6729).

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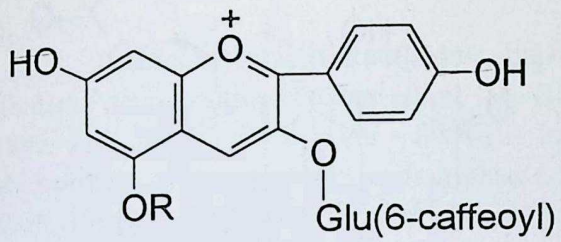
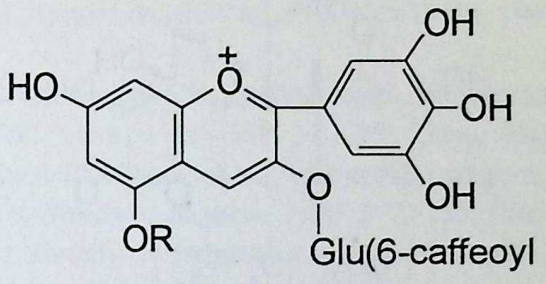
NEW COMPOUND



Salvianin
R = Glu(4,6-dimalonyl)
Monodemalonylsalvianin
R = Glu(6-malonyl)
Bisdemalonylsalvianin
R = Glu



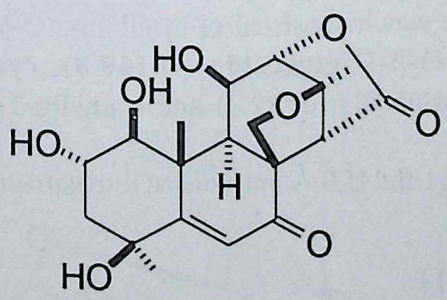
Salviadelphin
R = Glu(4,6-dimalonyl)
Monodemalonylsalviadelphin
R = Glu(6-malonyl)
Bisdemalonylsalviadelphin
R = Glu

SAMADERA (Simaroubaceae)

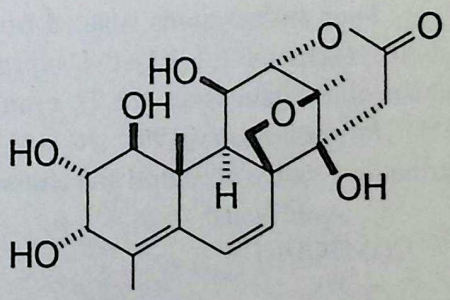
S. indica Gaertn. syn. *S. lucida* Wall., *Quassia indica* (Gaertn.) Nooteb. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 606).

Two new quassinoids - indaquassins A and B - isolated from bark and their stereostructures determined by 2D-NMR (*Phytochemistry* 1993, *34,* 505); isolation of four more quassinoids - indaquassins C, D, E and F - from bark together with samaderines B, C, D and E, dihydrosamaderine B, brucein D, soulameolide, cedronin and canthin-2,6-dione; structures of new compounds established (*Phytochemistry* 1994, *35,* 459).

NEW COMPOUNDS



Indaquassin A



Indaquassin B

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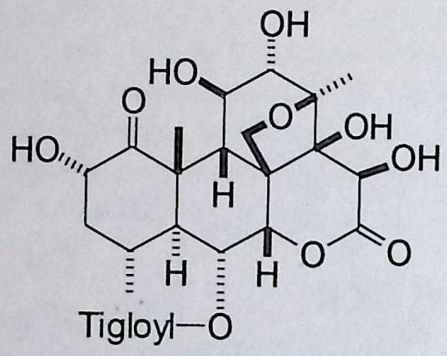

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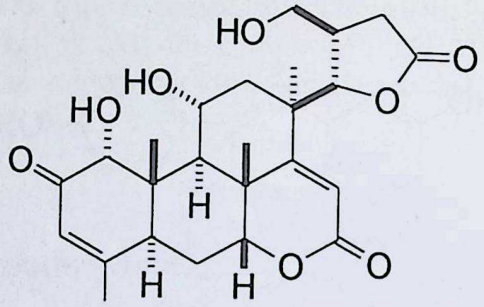

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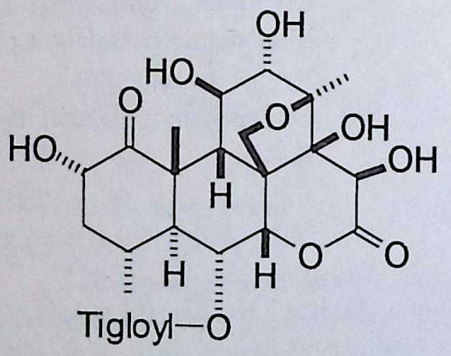

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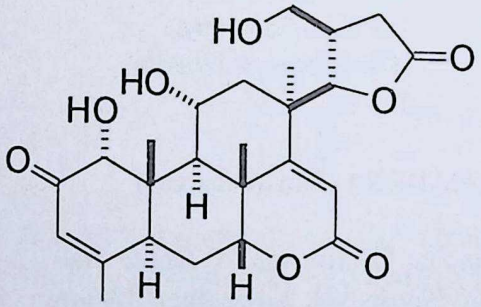


Indaquassin F

S. lucida Wall.; see *S. indica* Gaertn.

SAMBUCUS (Carprifoliaceae)

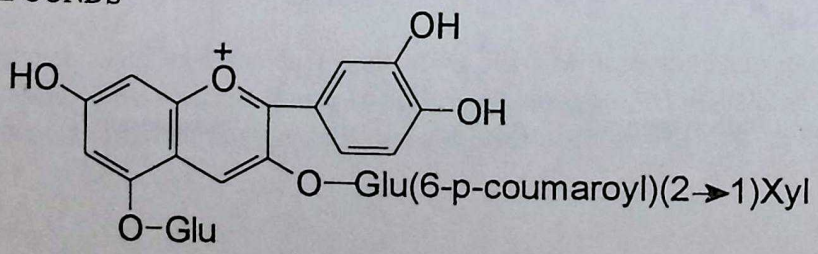
S. canadensis L.

Eng. - American elder.

Four anthocyanins isolated from fruits which consisted of cyanidin-3-O-(6"-O-E-p-coumaroyl)glucosyl(2→1)-β-D-xylosido-5-O-β-D-glucoside (I) (69.8), cyanidin-3-sambubioside-5-glucoside (22.7), cyanidin-3-sambubioside (2.3) and cyanidin-3-glucoside (2.1%) (*Phytochemistry* 1991, *30,* 4137).

Distribution: Native of central and eastern Canada and U.S.A, introduced into gardens of India and Nepal.

NEW COMPOUNDS



I

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S. ebulus L.; see *S. wightiana* Wall. ex Wt. & Arn.

S. nigra L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 568).

Lauric, myristic, tetradecenoic, heptadecenoic, palmitic, stearic, oleic, linoleic and linolenic acids obtained from seed oil (*Sb. UVTIZ Potravin Vedy* 1989, *7,* 289; *Chem. Abstr.* 1990, *112,* 232544 q); a lectin - SNA-II - isolated from bark, is a blood group nonspecific glycoprotein containing 7.8% carbohydrate (*Arch. Biochem. Biophys.* 1990, *277,* 255; *Chem. Abstr.* 1990, *113,* 55829 j); flowers afforded isorhamnetin-3-O-gluceside and isorhamnetin-3-O-rutinoside (*Ann. Pharm. Fr.* 1991, *49,* 258; *Chem. Abstr.* 1992, *117,* 23289 z).

S. wightiana Wall. ex Wt. & Arn. syn. *S. ebulus* Hook.f. (non L.) (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 608).

Lauric, myristic, palmitic, palmitoleic, stearic, oleic, linoleic and linolenic acids identified in seed oil (*Sb. UVTIZ Potravin Vedy* 1989, *7,* 289; *Chem. Abstr.* 1990, *112,* 232544 q).

SANDORICUM (Meliaceae)

S. indicum Cav.; see *S. koetjape* (Burm.f.) Merr.

S. koetjape (Burm.f.) Merr. syn. *S. indicum* Cav. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 608).

Two new limonoids - sandoricin and 6-hydroxysandoricin - from seeds and their structures determined by X-ray analysis (*J. Nat. Prod.* 1991, *54,* 241); isolation of a new seco-triterpene - koetjapic acid - from stems together with 3-oxoolean-12-en-29-oic acid, katonic acid, (–)alloaromadendrene, (–)caryophyllene oxide and (+)spathulenol (*J. Nat. Prod.* 1992, *55,* 654).

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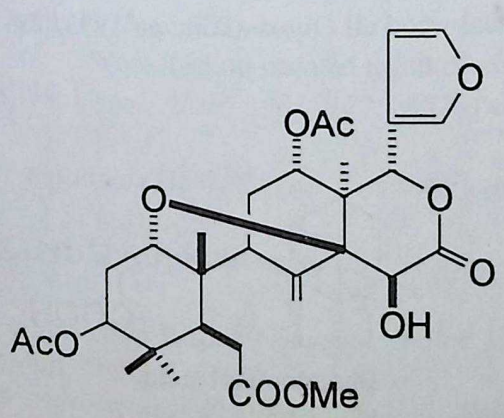
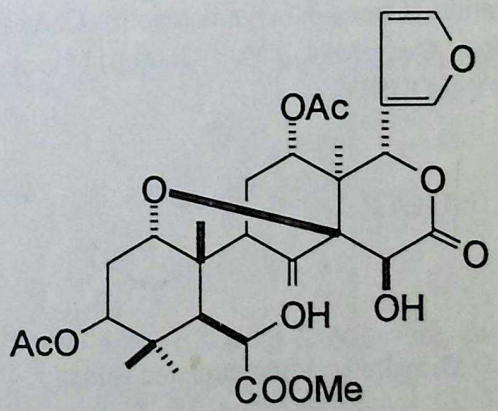


Sandoricin



6-Hydroxysandoricin

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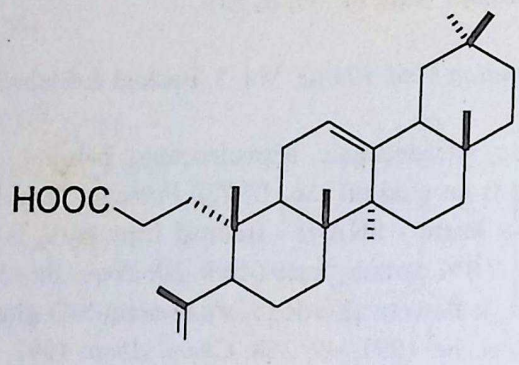


Koetjapic acid

BIOLOGICAL ACTIVITY

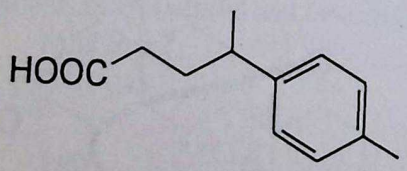
Sandoricin and 6-hydroxysandoricin were effective antifeedants when incorporated into artificial diet and fed to fall armyworm, *Spodoptera frugiperda,* or European corn borer, *Ostrina nubilalis,* larvae. Low doses reduced growth rate and increased time to pupation while high doses caused significant mortality (*J. Nat. Prod.* 1991, *54,* 241); 3-oxoolean-12-en-29-oic acid and katonic acid exhibited significant cytotoxic activity against cultured P-388 cells with ED50 0.61 and 0.11 μg/ml respectively. Significant cytotoxicity was also observed against a variety of cultured human cancer cells (*J. Nat. Prod.* 1992, *55,* 654).

SANTALUM (Santalaceae)

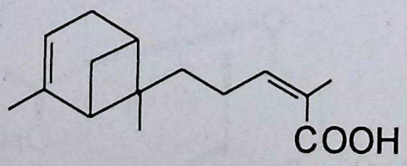
S. album L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 652).

Two new terpenoic acids - dihydro-α-norcurcumenic acid and α-bergamotenic acid - together with dihydro-α-santalic acid isolated from wood oil and structures of new compounds determined (*Ann. Chem.* 1990, 119); stereoselective synthesis of (Z)- and (E)β-santalols and ent-β-santalene (*Tetrahedron Asymmetry* 1990, *1,* 537; *Chem. Abstr.* 1991, *114,* 82158 s); identification of trans-α-bergamotenol in Chinese sandal wood oil (*Yaoxue Xuebao* 1993, *28,* 840; *Chem. Abstr.* 1994, *120,* 102000 p).

NEW COMPOUNDS



Dihydro-α-norcurcumenic acid



α-Bergamotenic acid

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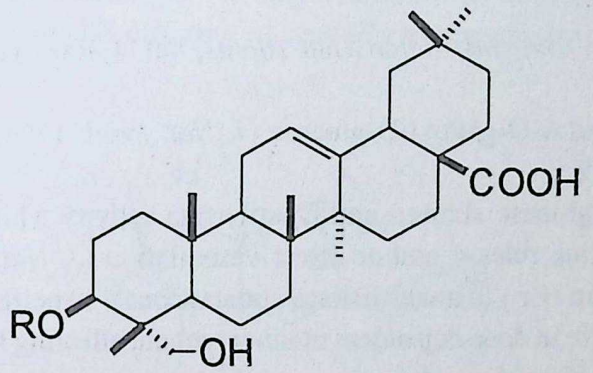
SAPINDUS (Sapindaceae)

S. emarginatus Vahl syn. *S. trifoliatus* sensu Hook.f., p.p. (non L.) (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 570).

Purified extract of fruit *in vitro* showed MIC 12.5 to 25.0 μg/ml against four fungi (Jpn. 2,160,798 (1990) Jun. 20; *Chem. Abstr.* 1990, *113,* 218226 b).

Two new hederagenin glycosides - emarginatosides B and C - isolated from pericarp of fruits and characterised (*Indian J. Chem.* 1990, *29*B, 268); a process developed for preparation of purified alcoholic extract of rind of fruit which contained saponin A (10.8), sapindoside B (10.6), saponin C (5.1) and sapindoside A (0.8%) (Jpn. 2,160,798 (1990) Jun. 20; *Chem. Abstr.* 1990, *113,* 218226 b); oleic (58.2), arachidic (15.9), 11-eicosenoic (8.6%), 11-octadecenoic and 13-eicosenoic acids together with cyanolipids determined in seed oil (*Fett. Wiss. Technol.* 1994, *96,* 69; *Chem. Abstr.* 1994, *121,* 53899 y).

NEW COMPOUNDS



Emarginatoside B
R = Glu(2→)Gal
Emarginatoside C
R = Gal(2→1)Gluc.acid

S. mukorossi Gaertn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 653).

A surfactant isolated together with oleic acid (*Tianran Chanwu Yanjiu Yu Kaifa* 1993, *5,* 76; *Chem. Abstr.* 1994, *120,* 265764 e).

S. trifoliatus Hook. f.; see *S. emarginatus* Vahl

SAPIUM (Euphorbiaceae)

S. baccatum Roxb. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 610).

A new alkaloid - (-)bukittinggine - isolated from leaves and its crystal structure and absolute configuration determined (*Aust. J. Chem.* 1990, *43,* 185).

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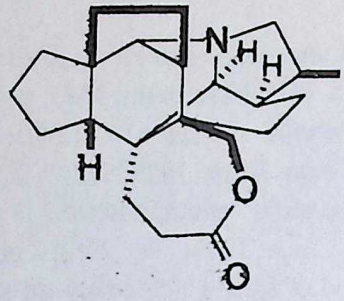
NEW COMPOUNDS



(-)Bukittinggine

S. eugniifolium Hook.f. (*eugniaefolium*) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 654).

Isolation of 6-hydroxykaempferol-7-O-glucosyl(1→6)-rhamnoside from leaves (*Phytochemistry*1991, *30*, 2815).

S. sebiferum (L.) Roxb. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 655).

Leaves contained 6-O-galloyl-D-glucose (*J. Nat. Prod.* 1994, *57*, 308).

BIOLOGICAL ACTIVITY

6-O-Galloyl-D-glucose showed antihypertensive activity which appears to be due to inhibition of noradrenaline release and/or direct vasodilation (*J. Nat. Prod.* 1994, *57*, 308); administration of geraniin (i.v.) to anaesthetised spontaneously hypertensive and normotensive rats lowered blood pressure in dose-dependent manner without affecting heart rate. It also reduced plasma noradrenaline in dose-dependent manner which was not influenced by adrenalectomy. Results suggest that geraniin lowers blood pressure through reduction of nroadrenaline release or by direct vasorelaxation (*J. Pharm. Pharmacol.* 1994, *46*, 46).

SAPONARIA (Caryophyllaceae)

S. officinalis L.

Eng. - Bouncing bet, Soapwort.

Two saponins in yields of 0.12 and 0.04% isolated from seeds and partially characterised (*Shengwu Huaxue Zazhi* 1993, *9*, 377; *Chem. Abstr.* 1994, *120*, 116547 j).

Distribution : Introduced into Indian gardens.

S. vaccaria L. ; see *Vaccaria pyramidata* Medik. var. *pyramidata*

SARACA (Caesalpiniaceae)

S. asoca (Roxb.) de Wilde syn. *S. indica* auct. (non L.) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 655).

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Palmitic, stearic, oleic, linoleic, myristic, linolenic and arachidic acids identified in total lipids, phospholipids and glycolipids of seeds of Vidarbha region by GLC (*Indian J. Pharm. Sci.* 1992, *54*, 105); quercetin and its 3-O-rhamnoside, kaempferol-3-O-α-L-rhamnoside, amyrin, ceryl alcohol and β-sitosterol isolated from leaves and stems (*Bull. Fac. Sci., Assiut Univ.* 1992, *21*, 45; *Chem. Abstr.* 1994, *120*, 4568 k).

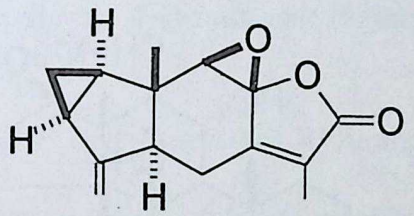
S. indica L., see *S. asoca* (Roxb.) de Wilde

SARCANDRA (Chloranthaceae)

S. glabra (Thunb.) Nakai syn. *Chloranthus glaber* (Thunb.) Makino, *C. brachystachys* Blume (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 656).

A new sesquiterpene - chloranthalactone F - isolated together with chloranthalactones A, B and E, atractylenolide II and (-)4β,7α-dihydroxyaromadendrane; new compound found to be isomer of chloranthalactone B differing in stereochemistry of oxirane ring (*Phytochemistry* 1993, *33*, 713).

NEW COMPOUNDS



Chloranthalactone F

SARCOCEPHALUS (Rubiaceae)

S. cordatus Miq.; see *Nauclea orientalis* (L.) L.

SARCOSTEMMA (Asclepiadaceae)

S. secamone (L.) Bennet syn. *Oxystelma esculentum* (L.f.) R.Br. ex Schult., *O. secamone* (L.) Karst. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 657).

A new pregnane triglycoside - esculentin - isolated and characterised as sarcogenin-3-O-β-D-thevetosyl(1→4)-O-β-D-cymaropyranosyl(1→4)-O-β-D-oleandroside (*Phytochemistry* 1990, *29*, 3967); another new cardenolide, a tetraglycoside of 3-epi-uzarigenin - oxyline - isolated and its structure established (*Phytochemistry* 1991, *30*, 301); two more cardenolides - oxystelmoside and oxystelmine - isolated from roots and characterised as uzarigenin-3-O-β-D-xylosyl(1→4)-O-β-D-digitaloside and periplogenin-3-O-6-deoxy-β-D-glucosyl(1→4)-O-α-D-digitaloside respectively (*Phytochemistry* 1993, *32*, 1019).

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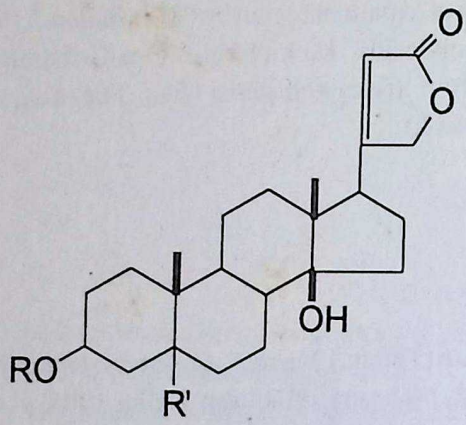
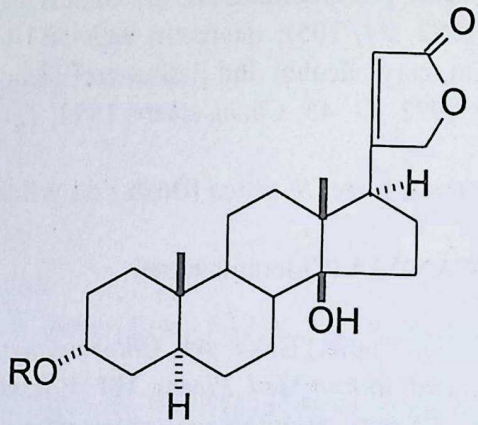
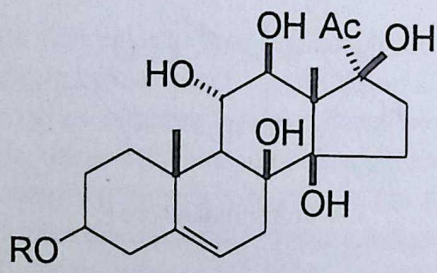


Oxystelmoside
R = Digitalose(4→1)Xyl, R' = α-H
Oxystelmine
R = Digitalose(4→1)Glu(6-deoxy),
R' = β—OH



Oxyline
R = Digitoxose (4→1)Cymarose(4→1)
Thevetose(4→1)Cymarose

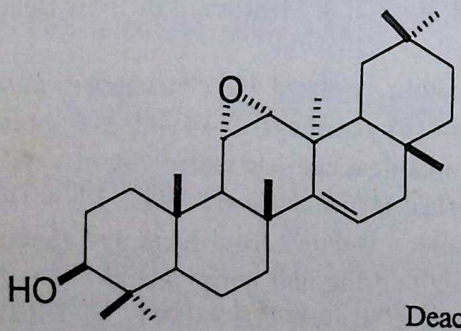


Esculentin
R = Oleandrose(4→1)Cymarose(4→1)Thevetose

S. stocksii Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 658).

Isolation and structure elucidation of deacetylmarsformoxide B; α-amyrin cinnamate also obtained (*Fitoterapia* 1989, *60*, 351).

NEW COMPOUNDS



Deacetylmarsformoxide B

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SAROTHAMNUS (Papilionaceae)

S. scoparius (L.) Wimm. ex W.D.J. Koch syn. *Cytisus scoparius* (L.) Link (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 658).

Leaves contained astragalin, isoquercitrin, kaempferol, 3'-O-methylorobol, orientin, quercetin, scoparin, β-sitosterol, its glucoside and vitexin (*Annu. Rep. Tohoku Coll. Pharm.* 1989, 111; *Chem. Abstr.* 1991, *114*, 98211 q); stereoselective synthesis of α-isosparteine (*J. Chem. Soc.* Perkin 1 1990, 2593); a new ester - (-)3β-hydroxy-13α-tigloyloxylupanine - isolation from seedlings and synthesised; (-)3β,13α-dihydroxylupanine, (+)13α-tigloyloxylupanine, (+)13α-hydroxylupanine, (+)lupanine, (-)sparteine and (-)17-oxosparteine also isolated (*Phytochemistry* 1994, *36*, 309).

SATUREJA (Lamiaceae)

S. hortensis L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 574).

Leaves contained apigenin-7-O-glucuronoside, luteolin-7-O-glucoside and luteolin-7-O-glucuronoside (*Pharm. Acta Helv.* 1990, *65*, 239; *Chem. Abstr.* 1990, *113*, 227982 x); diosmin and 5,3',4'-trihydroxyflavone-7-O-rutinoside isolated (*Pol. J. Chem.* 1991, *65*, 2291; *Chem. Abstr.* 1992, *116*, 252136 u).

S. montana L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 658).

Plant contained 13.0% tannins; caffeic, chlorogenic and rosmarinic acids identified (*Bull. Fac. Pharm.*, Cairo Univ. 1993, *31*, 237, *Chem. Abstr.* 1994, *120*, 212569 p).

SAUSSUREA (Asteraceae)

S. gossypiphora D. Don var. *gossypiphora*

H. - Phenkamal, Jogipasha, Hiyun kauni.

Umbelliferone, its 7-O-glucoside, scopoletin, β-sitosterol, apigenin and its 7-O-glucoside isolated (*Zhiwu Xuebao* 1989, *31*, 398; *Chem. Abstr.* 1990, *112*, 95531 s); quercetin, chrysoeriol-7-O-β-D-glucoside, apigenin, its 7-O-glucoside and 7-O-neohesperidoside isolated from aerial parts (*Xibei Shifan Daxue Xuebao Ziran Kexueban* 1990, 42; *Chem. Abstr.* 1991, *115*, 252064 y); isolation and structure elucidation of ergostan-3,24-diol and 2-hydroxylappaol B from aerial parts (*Chinese Chem. Lett.* 1991, *2*, 373; *Chem. Abstr.* 1991, *115*, 203293 p; *Gaodeng Xuexiao Huaxue Xuebao* 1991, *12*, 1613; *Chem. Abstr.* 1992, *117*, 167722 h; *Zhongcaoyao* 1992, *23*, 283; *Chem. Abstr.* 1992, *117*, 198323 h); in addition, tritriacontane, 1-tetracontene, dotriacontanoic acid, β-sitosterol, stigmast-7-en-3-ol, arctigenin, quercetin, arctiin, chrysoeriol-7-O-β-D-glucoside, apigenin, its 7-O-β-D-glucoside and 7-O-β-D-neohesperidoside also isolated from aerial parts (*Gaodeng Xuexiao Huaxue Xuebao* 1991,

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12, 1613; *Chem. Abstr.* 1992, *117*, 167722 h; *Zhongcaoyao* 1992, *23*, 283; *Chem. Abstr.* 1992, *117*, 198323 h); plant afforded β-sitosterol, 3-stigmastanol, stigmast-7-en-3-ol and ergostan-3,24-diol (*Zhongguo Zhongyao Zazhi* 1991, *16*, 356; *Chem. Abstr.* 1991, *115*, 228375 e); essential oil from whole plant contained ethyl linoleate (20.0), ethyl palmitate (11.0) and methyl 8-cyclopropyl-2-octyloctanoate (8.0%) (*Zhongguo Yaoxue Zazhi* 1991, *26*, 526; *Chem. Abstr.* 1992, *116*, 191032 h); heptacosane, hentriacontane, nonacosane, α- and β-amyrins and their acetates and palmitates, lupeol, its acetate, fructose, glucose and sucrose isolated from aerial parts of plant collected from Himalayas (*Shoyakugaku Zasshi* 1991, *45*, 274; *Chem. Abstr.* 1992, *116*, 158675 x).

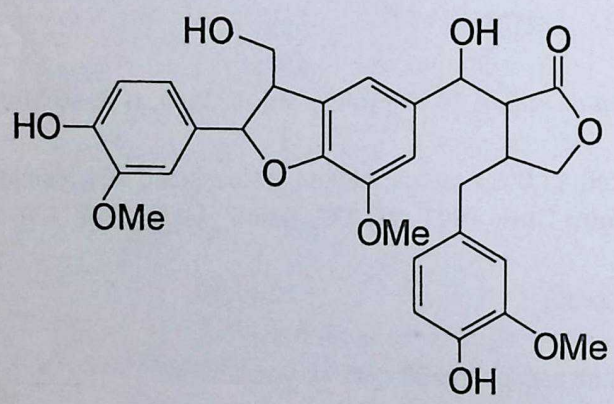
Distribution : Himalayas, from Garhwal to Sikkim, alt. 4200-5100 m.

S. hieracioides Hook. f.

A new sesquilignan - saussol - isolated from aerial parts together with scopoletin, umbelliferone, chrysoeriol, luteolin, arctiin, skimmin, luteolin-7-O-β-D-glucoside and syringin; structure of new compound established (*Gaodeng Xuexiao Huaxue Xuebao* 1989, *10*, 1090; *Chem. Abstr.* 1990, *113*, 74749 z).

Distribution : Sikkim Himalayas, alt. 3600-4200 m.

NEW COMPOUNDS



Saussol

S. lappa (Decne.) Sch.-Bip. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 659).

Acetone extract of roots (25.0 mg, orally) enhanced gastrointestinal motility in mice (*Phytother. Res.* 1990, *4*, 160; *Chem. Abstr.* 1991, *114*, 35751 v).

Dihydrocostus lactone isolated as an active principle (*Phytother. Res.* 1990, *4*, 160; *Chem. Abstr.* 1991, *114*, 35751 v); a new sesquiterpenoid - saussureal - isolated from roots and its structure established (*Phytochemistry* 1992, *31*, 336); roots afforded costunolide and dihydrocostunolide (*Fitoterapia* 1993, *64*, 84); isolation of 4β-methoxydehydrocostus lactone from roots and its structure determination (*Phytochemistry* 1992, *31*, 2529); 15-hydroxydehydrocostus lactone isolated and characterised (*J. Inst. Chemists*, Calcutta 1992, *64*,

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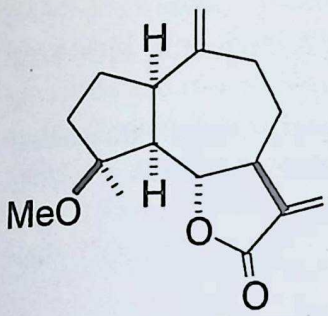
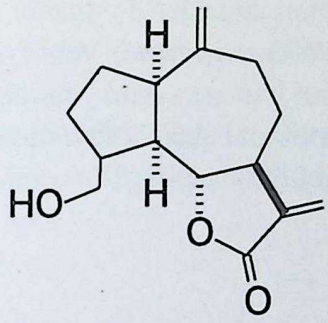
32; *Chem. Abstr.* 1994, *120*, 73351 w); five new amino acid-sesquiterpene adducts - aussureamines A, B, C, D and E - and a new lignan glycoside - (-)massoniresinol-4"-O-β-D-glucoside isolated from roots and characterised (*Chem. Pharm. Bull.* 1993, *41*, 214).

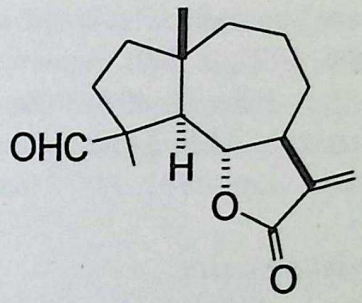
NEW COMPOUNDS



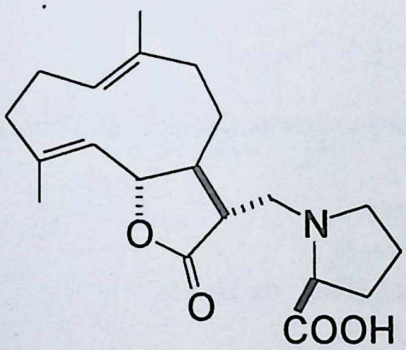
4β-Methoxydehydro costus lactone



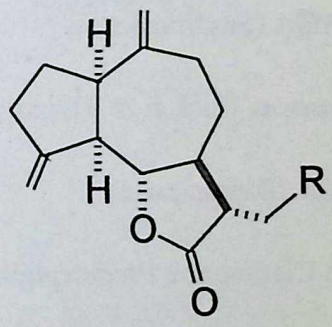
15-Hydroxydehydro costus lactone



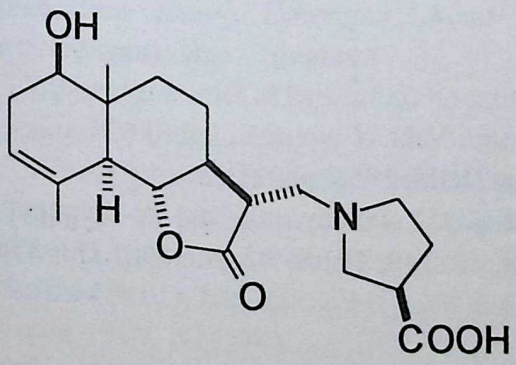
Saussureal



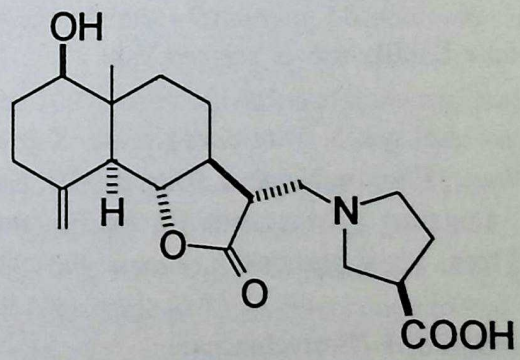
Saussureamine A



Saussureamine B
R = β-2-Carboxy pyrrolidinyl
Saussureamine C
R = $NHCH(COOH)CH_2CONH_2$



Saussureamine D



Saussureamine E

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BIOLOGICAL ACTIVITY

Saussureal exhibited plant growth regulatory activity (*Phytochemistry* 1992, *31*, 336); 4β-methoxydehydrocostus lactone showed significant activity as plant growth regulator (*Phytochemistry* 1992, *31*, 2529).

S. medusa Maxim. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 660).

Isolation of luteolin, apigenin and their 7-O-α-L-rhamnosyl(1→2)-β-D-glucosides, quercetin-3-O-β-D-glucoside and arctiin (*Gaodeng Xuexiao Huaxue Xuebao* 1990, *11*, 202; *Chem. Abstr.* 1991, *114*, 3468 s).

S. stella Maxim.

Apigenin, acacetin, tilianin, kaempferol, its 3-O-rhamnoside and quercitrin isolated (*Lanzhou Daxue Xuebao, Ziran Kexueban* 1989, *25*, 64; *Chem. Abstr.* 1990, *113*, 20879 y). Distribution: Himalayas, Sikkim to Bhutan, alt. 3300-4500 m.

SAXIFRAGA (Saxifragaceae)

S. purpurascens Hook.f. & Thoms.; see *Bergenia purpurascens* (Hook.f. & Thoms.) Engl.

SCABIOSA (Dipsacaceae)

S. hookeri Clarke; see *Pterocephalus hookeri* (Clarke) Hook. ex Diels

SCAEVOLA (Goodeniaceae)

S. frutescens Krause; see *S. sericea* Vahl

S. koenigii Vahl; see *S. sericea* Vahl

S. montana Labill; see *S. sericea* Vahl

S. sericea Vahl syn. *S. frutescens* Krause, *S. koenigii* Vahl, *S. montana* Labill (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 223).

Loganin, sylvestroside III, its dimethyl acetal, cantleyoside and its dimethyl acetal isolated from aerial parts (*Ann. Pharm. Fr.* 1989, *47*, 249; *Chem. Abstr.* 1990, *113*, 3250 u).

SCEPTRIDIUM (Botrychiaceae)

S. ternatum (Thunb.) Lyon. var. *ternatum*; see *Botrychium ternatum* (Thunb.) Sw.

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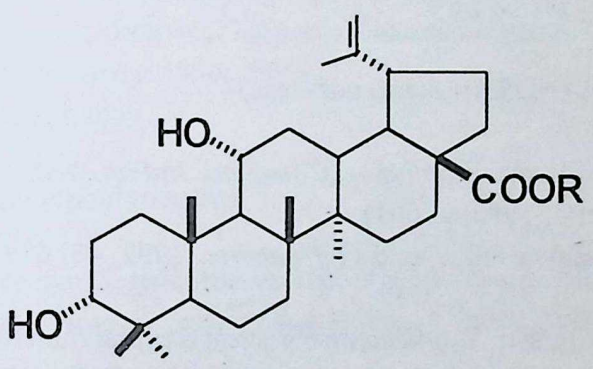
SCHEFFLERA (Araliaceae)

S. impressa (Clarke) Harms syn. *Heptapleurum impressum* Clarke (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 661).

A new acetylated saponin isolated from bark and stem and characterised as hederagenin-3-O-β-D-(6'-acetyl)glucoside; β-sitosterol, triacontanoic acid and tetracosanoic acid also isolated (*J. Nat. Prod.* 1989, *52*, 1342; *Fitoterapia* 1990, *61*, 376); in addition, β-sitosterol glucoside and α- and β-amyrins isolated from stem and bark (*Fitoterapia* 1990, *61*, 379); stem and bark afforded a new saponin, impressoside A, characterised as 3α,11α-dihydroxylup-20(29)-en-28-oic acid-28-O-β-D-glucosyl(1→6)-β-D-glucoside; impressic acid also isolated (*J. Nat. Prod.* 1992, *55*, 298, 810).

NEW COMPOUNDS



Impressic acid
R = H
Impressoside A
R = Glu(6→1)Glu

S. venulosa (Wt. & Arn.) Harms var. *venulosa* syn. *Heptapleurum venulosum* Seem.

H. - Dain, Kathsemul, Kursemul, Karbot, Semul; Beng. - Ban-simar; Mar. - Rawanito; Tam. - Modakama; Kan. - Bili-bhuthala, Tengar-bali, Huli-pachkiballi; Oriya - Jari; Assam - Jokhuni-hata, Dhobailata; Khasi - Dieng-meising-hat, Jarmi-mong-boi, Dieng-soh-luait, Mei-soh-syrkan; Garo - Jeng-jil, Dorengmi; Lushai - Kelbu; Santal - Sunumjur; Mundari - Panikawar, Superari, Ned nanri; Nep. - Singhata.

Ethanolic extract of leaves (2.0%) caused 100% immobilization of human spermatozoa (*Fitoterapia* 1993, *64*, 274).

A new betulinic acid glycoside isolated from leaves and characterised as lup-20(29)-en-28-oic acid-3-O-β-D-glucosyl(1→2)-O-β-D-glucoside (*Phytochemistry* 1991, *30*, 2419); β-sitosterol (0.2), β-amyrin (0.15), β-sitosterol-β-D-glucoside (0.10), oleanolic acid (0.095), oleanonic acid (0.05), betulinic acid (0.02) and its glucoside (0.02%) determined in leaf extract (*Fitoterapia* 1993, *64*, 274).

Distribution: Throughout India, including Andamans, ascending to 1800 m.

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SCHINUS (Anacardiaceae)

S. molle L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 661).

Determination of α-pinene (11.7), β-pinene (10.8), α-phellandrene (10.4), limonene (9.3), phellandral (8.4), geranyl acetate (8.2), β-phellandrene (6.3), δ-cadinene (3.8), α-cadinene (3.2) and p-cymene (3.2%) by GC-MS in essential oil of leaves and twigs of plant from Argentina (*Essenze Deriv. Agrum.* 1989, *59*, 51; *Chem. Abstr.* 1990, *112*, 145319 b); leaf essential oil of Italian plant contained α-phellandrene (30.2), elemol (13.3), β-phellandrene (9.6), limonene (9.3), germacrene D (5.2), T-cadinol (4.7) and γ-eudesmol (3.2%); essential oil from berries contained α-phellandrene (55.4), β-phellandrene (15.4) and limonene (14.3%) alongwith elemol, germacrene D, γ-eudesmol and T-cadinol in traces (*Flavour Fragrance J.* 1990, *5*, 49; *Chem. Abstr.* 1990, *113*, 57618 p).

SCHISANDRA (SCHIZANDRA) (Schisandraceae)

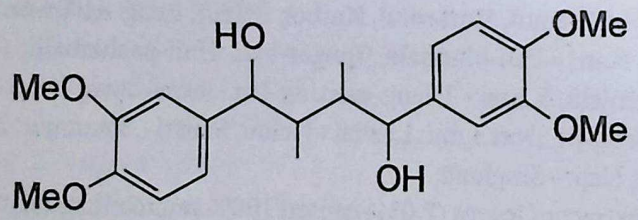
S. propinqua (Wall.) Baill. var. *propinqua* (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 661).

Synthesis of manwuweizic acid (*Tetrahedron* 1992, *48*, 6793).

S. rubriflora Rehd. & Wils. syn. *S. sphenanthera* sensu Kanjilal (non Rehd. & Wils.) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 662).

A process developed for extraction of schisandrin, deoxyschisandrin and gomisins A and C (PCT 9,001,487 (1990) Feb. 22; *Chem. Abstr.* 1990, *113*, 84821 f); a lignandiol (I) isolated and its absolute configuration determined (*Chinese Chem. Lett.* 1993, *4*, 31; *Chem. Abstr.* 1994, *120*, 265757 e).

NEW COMPOUNDS



I

BIOLOGICAL ACTIVITY

Schisanhenol (1.0 mM) inhibited iron/cysteine-induced lipid peroxidation and membrane fluidity of rat liver microsomes as well as superoxide anion production in xanthine/xanthine oxidase system (*Planta Med.* 1992, *58*, 311).

S. sphenanthera Rehd. & Wils.; see *S. rubriflora* Rehd. & Wils.

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SCHIZOLOBIUM (Caesalpiniaceae)

S. parahybum Blake

H. - Basanti.

A linear (1→5) linked α-L-arabinofuranan from seeds (*Carbohydr. Res.* 1992, *233*, 265; *Chem. Abstr.* 1992, *117*, 208936 b).

Distribution: Native of Brazil, introduced into Indian gardens.

SCHOENUS (Cyperaceae)

S. nigricans L.

Isolation and structure elucidation of 3,5,3',4'-tetramethoxystilbene, 3,5,4'-trimethoxy-2-prenylstilbene, 3-hydroxy-5,4'-dimethoxy-2-prenylstilbene, 3,4'-dihydroxy-5-methoxy-2-prenylstilbene, 5,7,4',5'-tetrahydroxy-6,3'-diprenylflavanone and 5,7,4',5'-tetrahydroxy-8,3'-diprenylflavanone (*Phytochemistry* 1994, *36*, 803).

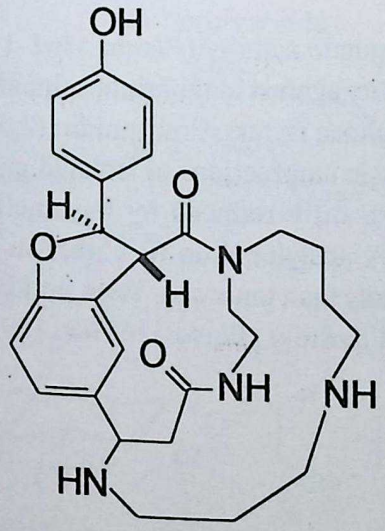
Distribution: North-western India.

SCHWEINFURTHIA (Scrophulariaceae)

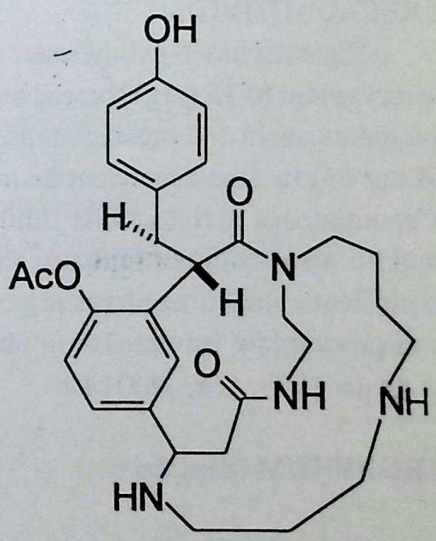
S. papilionacea (L.) Boiss. syn. *S. sphaerocarpa* (Benth.) A. Braum ex Monatsber., *Antirrhinum glaucum* Stocks ex Wight (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 223).

Two new macrocyclic alkaloids - 11-epi-ephedradine A and schweinine - isolated from whole plant along with (-)ephedradine A and structures of new compounds determined (*J. Nat. Prod.* 1990, *53*, 1162).

NEW COMPOUNDS



11-Epi-ephedradine A



Schweinine

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BIOLOGICAL ACTIVITY

11-Epi-ephedradine A was mutagenic to *Salmonella typhimurium* (*J. Nat. Prod.* 1990, *53*, 1162).

S. sphaerocarpa (Benth.) A. Braum ex Monatsber.; see *S. papilionacea* (L.) Boiss.

SCINDAPSUS (Araceae)

S. officinalis (Roxb.) Schott (*Compend. Indian Med. Plants*, Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 365).

Fruit decoction (1.0 g/ml) administered orally or i.v. (1.0 ml/kg) exhibited significant antidiarrhoeal activity in albino rats. It (0.05-1.0 ml/kg) showed dose-dependent positive inotropic effect followed by transient myocardial depressant activity in high dose in frogs, whereas in dogs there was no significant effect on BP and respiration. The decoction was not toxic upto 10.0 ml/kg; at this dose, it exhibited significant analgesic activity in rats (*J. Res. Ayurveda & Siddha* 1990, *11*, 97).

A new hydroxy fatty acid isolated from seed oil and characterised as 11-hydroxy-cis,cis-5,8-tetracosadienoic acid; cyclopropenoid fatty acids also isolated (*Int. J. Food Sci. Technol.* 1992, *27*, 77; *Chem. Abstr.* 1992, *117*, 4248 u).

SCLEROCARYA (Anacardiaceae)

S. birrea Hochst.

(-)Epicatechin-3-galloyl ester isolated from bark (*Planta Med.* 1992, *58*, 178).

Distribution : Native of tropical Africa, introduced into India at Forest Research Institute, Dehra Dun.

BIOLOGICAL ACTIVITY

(-)Epicatechin-3-galloyl ester exhibited secretagogue activity (*Planta Med.* 1992, *58*, 174); procyanidin (0.15 g/kg) showed antidiarrhoeal activity against magnesium sulphate, castor oil, arachidonic acid and prostaglandin E2-induced diarrhoea in rats. Procyanidin (2.50 μg/ml to 0.64 mg/ml) in dose-dependent manner inhibited phasic contractions of isolated guinea pig ileum spontaneous activity; this inhibition was significantly reduced by hexamethonium. Procyanidin also modified biphasic response evoked by acetylcholine (0.1 μM) in isolated guinea pig ileum, inhibiting phasic response more profoundly than tonic one. Thus, antidiarrhoeal action of procyanidin is related to inhibition of intestinal motility (*Phytother. Res.* 1993, *7*, 25; *Chem. Abstr.* 1993, *118*, 183164 d).

SCLEROPYRUM (Santalaceae)

S. wallichianum (Wt. & Arn.) Arn.; see *Sclerospermum pentrandum* (Dennst.) Mabberley

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SCLEROSPERMUM (Santalaceae)

S. pentrandum (Dennst.) Mabberley syn. *Scleropyrum wallichianum* (Wt. & Arn.) Arn.

Octadec-9-ynoic, 17-octadecen-9-ynoic, decanoic, lauric, palmitic, stearic, arachidic, behenic, hexadecenoic, oleic, eicosenoic, erucic and linoleic acids identified in seed oil (37.7%) (*Yunnan Zhiwu Yanjiu* 1992, *14*, 101; *Chem. Abstr.* 1992, *117*, 66648 h).

Distribution : Peninsular India, ascending to 1500 m in the hills.

SCOLOPIA (Flacourtiaceae)

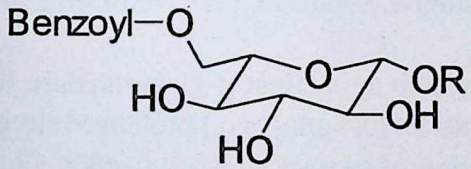
S. roxburghii (Benn.) Clos.; see *S. spinosa* (Roxb.) Warb.

S. spinosa (Roxb.)Warb. syn. *S. roxburghii* (Benn.) Clos.

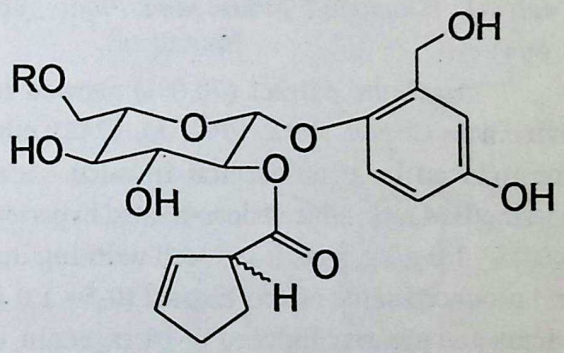
A new glucoside - scoloposide A - along with apigenin isolated from leaves and characterised; roots afforded four more glucosides - scoloposides B, C, D and E - whose structures established; poliothrysoside [2-(6-benzoyl-β-glucosyloxy)-5-hydroxybenzyl alcohol], friedelin and 7-oxo-β-sitosterol isolated from stems (*Phytochemistry* 1994, *36*, 1021).

Distribution : Nicobar Islands.

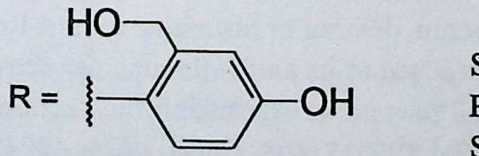
NEW COMPOUNDS

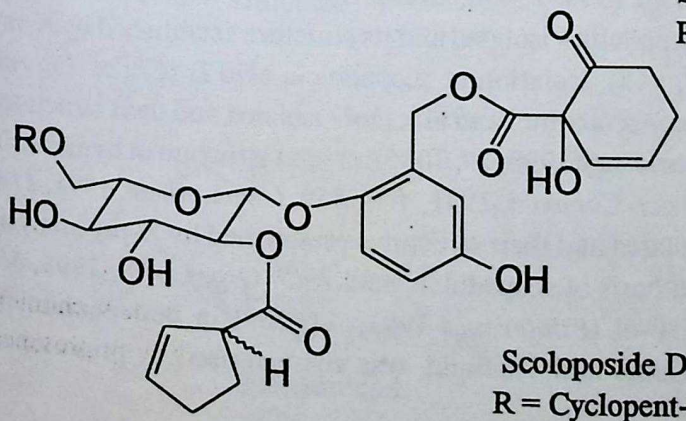


Scoloposide A
R = Me
Poliothrysoside



Scoloposide B
R = H
Scoloposide C
R = Cyclopent-2-enoyl





Scoloposide D
R = Cyclopent-2-enoyl

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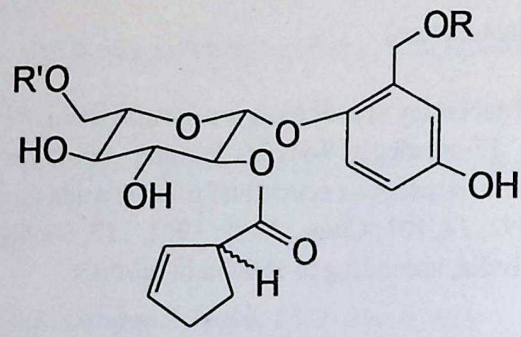
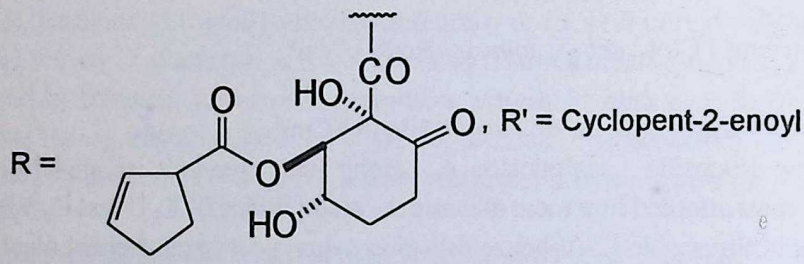


Scoloposide E



SCOPARIA (Scrophulariaceae)

S. dulcis L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 664).

Alcoholic extract (70.0%) showed inhibitory activity against β-glucuronidase from bovine liver (*J. Nat. Prod.* 1992, *55*, 1748); ethanolic extract (0.5 g/kg, p.o.) prolonged sleeping time induced by pentobarbital in mice. Administration of extract (0.5 - 2.0 g/kg, i.v.) to anaesthetised rats induced dose-related hypertension which was inhibited by alpha-blocker drugs. At 0.25 - 1.0 g/kg, p.o., it reduced writhing induced by acetic acid in mice; glutinol (0.03 g/kg, p.o.) produced same effect. Extract (0.5 - 1.0 g/kg) and glutinol (0.03 g/kg, p.o.), reduced paw oedema and pleurisy induced by carrageenin, dextran or histamine in rats. Results suggest that analgesic effects of extract are probably related to its anti-inflammatory activity. These effects are due mainly to presence of glutinol and flavonoids which exert their action on early phase of acute inflammatory process (*Phytother. Res.* 1993, *7*, 408; *Chem. Abstr.* 1994, *120*, 235671 e).

A new tetracyclic diterpene - scopadulin - isolated and its structure established by X-ray analysis (*Chem. Pharm. Bull.* 1990, *38*, 945); isolation of scopadulcic acid B (*Chem. Pharm. Bull.* 1990, *38*, 2740); two more diterpenes - scoparinol and dulcinol - isolated and their structures and stereochemistry determined (*Phytochemistry* 1990, *29*, 3035); crystal structure of hymenoxin determined (*Acta Crystallogr., Cryst. Struct. Commun.* 1991, *47C*, 459; *Chem. Abstr.* 1991, *114*, 142923 z); scoparic acids A, B and C isolated and their structures established by X-ray analysis (*J. Nat. Prod.* 1992, *55*, 1748); total synthesis of scopadulcic acid A (*J. Org. Chem.* 1993, *58*, 5304); aerial parts afforded glut-5-en-3β-ol (*Fitoterapia* 1993, *64*, 469); a new chemotype designated as SDX found in Taiwan, China and Thailand, was characterised by presence of

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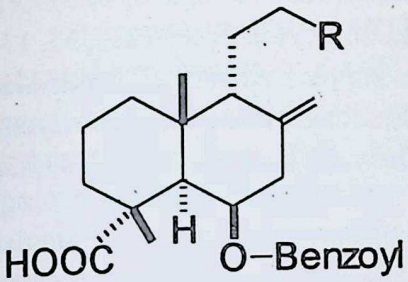
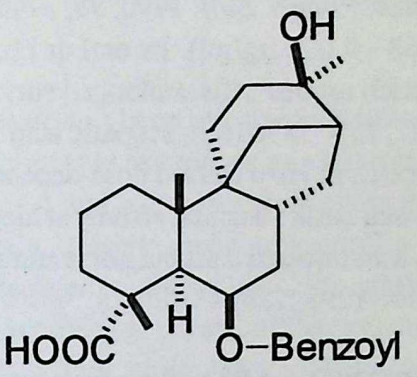
scopadulciol and scopadiol; structure of scopadiol determined to be 6-benzoyl-labda-8(17),13-dien-15,18-diol (*Phytochemistry* 1993, *32*, 349).

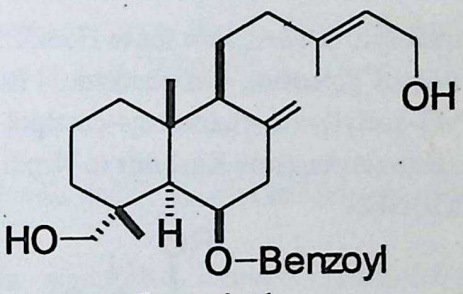
NEW COMPOUNDS



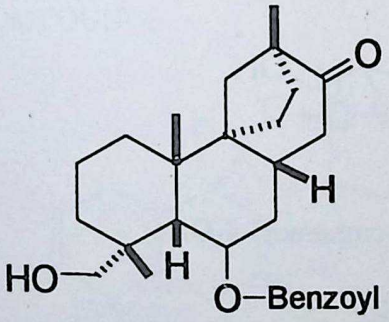
Scoparic acid A
R = C(Me)=CHCH$_2$OH
Scoparic acid B
R = Ac
Scoparic acid C
R = C(CHO)=CH$_2$



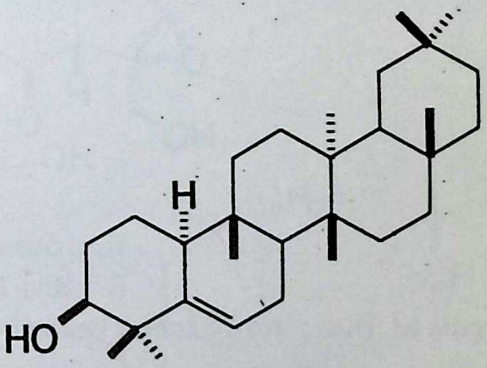
Scopadulin



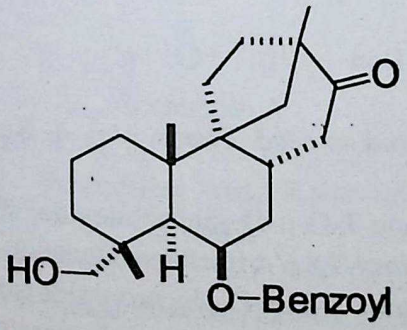
Scoparinol



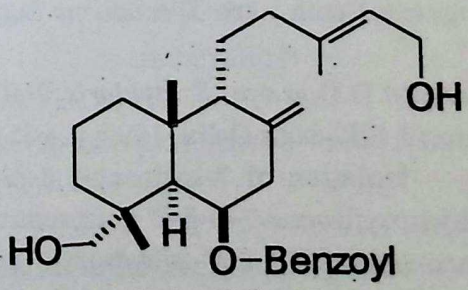
Dulcinol



Glut-5-en-3β-ol



Scopadulciol



Scopadiol

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BIOLOGICAL ACTIVITY

Scopadulcic acid B inhibited K^+-dependent ATP-ase activity of gastric proton pump (H,K^+-ATP-ase) in rats with IC50 of 20.0 - 30.0 μM and proton transport into gastric vesicles (*Chem. Pharm. Bull.* 1990, *38*, 2740); it was toxic to cell lines derived from tumor tissues (IC50 0.068 - 0.076 μg/ml). Its oral or i.p. administration (100.0 mg/kg/day) to mice inoculated with Ehrlich ascites cells prolonged survival time by 33% (*Phytother. Res.* 1992, *6*, 6; *Chem. Abstr.* 1992, *116*, 187616 j); scoparic acid A inhibited β-glucuronidase (*J. Nat. Prod.* 1992, *55*, 1748); acacetin *in vitro* caused dose-dependent inhibition of Herpes simplex virus type 1 replication. It showed weak virucidal activity at high concentration. Acacetin strongly inhibited protein synthesis in virus-infected cells but not in uninfected cells (*Antiviral Chem. Chemother.* 1993, *4*, 49; *Chem. Abstr.* 1993, *118*, 139306 c).

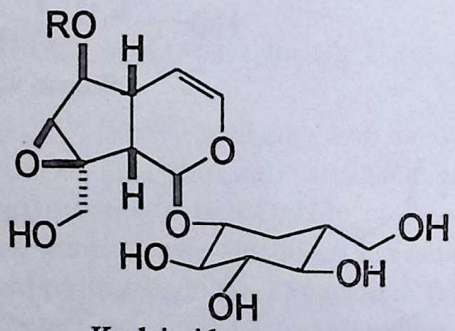
SCROPHULARIA (Scrophulariaceae)

S. koelzii Pennell syn. *S. variegata* sensu Hook.f. (non M.Bieb.)

An iridoid glycoside - koelzioside - isolated and characterised as 6-O-(2",3"-di-O-cinnamoyl-4"-O-acetyl)-α-L-rhamnosyl-catalpol (*Phytochemistry* 1992, *31*, 689).

Distribution : Himalayas, from Kashmir to Nepal, alt. 2700-5000 m.

NEW COMPOUNDS



Koelzioside

R = Rha(2,3-di-O-cinnamoyl-4-OAc)

S. variegata M. Bieb.; see *S. koelzii* Pennell

SCUTELLARIA (Lamiaceae)

S. angulosa Benth.; see *S. scandens* Buch.-Ham. ex D.Don

S. barbata D.Don syn. *S. rivularis* Wall. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 665).

Isolation of 7-hydroxy-5,8-dimethoxyflavone-7-O-β-D-glucuronoside, 5,7,8,2'-tetrahydroxyflavone-7-O-β-D-glucuronoside, 5,2'-dihydroxy-7,8,6'-trimethoxyflavone-2'-O-β-D-glucuronoside and 5,2',6'-trihydroxy-7,8-dimethoxyflavone-2'-O-β-D-glucuronoside from roots together with 7-O-β-D-glucuronosides of baicalein, wogonin, carthamidin and isocarthamidin

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(*Chem. Pharm. Bull.* 1990, *38*, 3488); a polysaccharide, SBP, isolated containing rhamnose, arabinose, xylose, mannose, galactose and glucose in molar ratio of 1.14:1.50: 0.20:0.75:1.0:2.18 respectively (*Tianran Chanwu Yanjiu Yu Kaifa* 1992, *4*, 1; *Chem. Abstr.* 1992, *117*, 4229 p); isolation of neoandrographolide and wogonin (*Zhiwu Ziyuan Yu Huangjing* 1993, *2*, 63; *Chem. Abstr.* 1994, *120*, 73479 u).

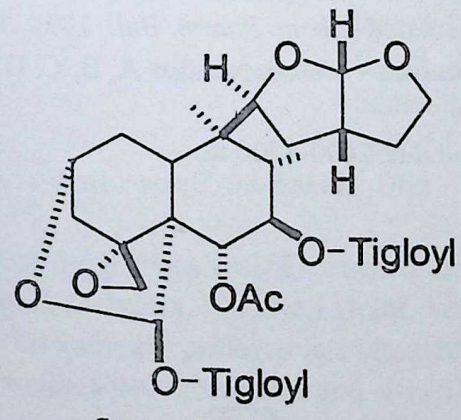
BIOLOGICAL ACTIVITY

Baicalein potentiated nerve-stimulated contractions *in vitro* in rat tail and femoral artery isometric ring preparations. It (10.0 μM) also increased sensitivity to exogenous norepinephrine, serotonin, arginine, vasopressin and to noncatecholamine α-1 and α-2 adrenergic agonists (*J. Pharmacol. Exp. Ther.* 1992, *263*, 78); baicalein, esculetin, baicalin, wogonin, esculin and scoparone inhibited proliferation of human T-lymphoid leukaemia cells. Baicalein exhibited maximum antiproliferative activity with IC50 4.7 μM. It also exhibited potent inhibitory activity on protein tyrosine kinase (*Eur. J. Pharmacol.* 1994, *268*, 73; *Chem. Abstr.* 1994, *121*, 49744 b); cytotoxicity of baicalin and baicalein investigated on human hepatoma cell lines (PLC/PRF/5, Hep-G2), human liver cells and a human pancreatic cancer line. IC50 for PLC/PRF/5 cells were 20.0 μg/ml and 50.0 μg/ml respectively (*Cancer Lett.* 1994, *86*, 91; *Chem. Abstr.* 1994, *121*, 292196 y).

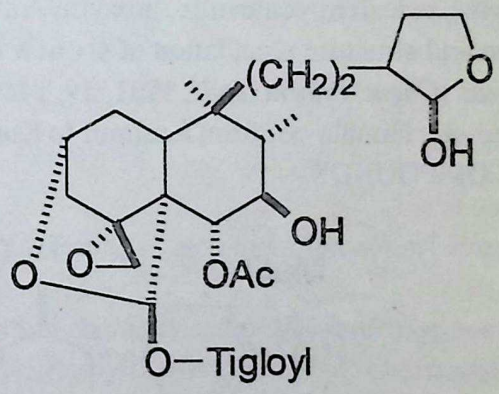
S. galericulata L. (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 619).

Two new neo-clerodane diterpenoids - scutegalins A and B - isolated from aerial parts and their crystal structures determined; jodrellin T and 14,15-dihydrojodrellin T also isolated (*Phytochemistry* 1993, *33*, 309).

NEW COMPOUNDS



Scutegalin A



Scutegalin B

BIOLOGICAL ACTIVITY

Scutegalins A and B showed antifeedant activity (*Phytochemistry* 1993, *33*, 309).

S. grossa Wall.

Three new flavonoids (I, II and III) isolated from roots of Nepalese plant and

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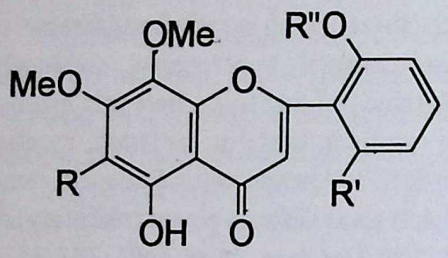
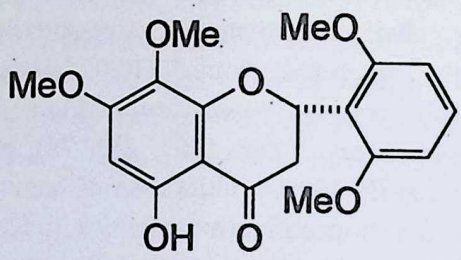
characterised; baicalein, its 6-O-β-glucuronoside, oroxylin, wogonin, chrysin, norwogonin and their 7-O-glucuronides, scutellarein, scutellarin, luteolin and 5-hydroxy-7,8,2'-trimethoxyflavone also isolated (*Chem. Pharm. Bull.* 1991, *39*, 1051).

Distribution : Himalayas, from Kashmir to Kumaon, alt. 1200-2400 m.

NEW COMPOUNDS





I

R = H, R' = OMe, R" = Me

II

R = OH, R',R" = H

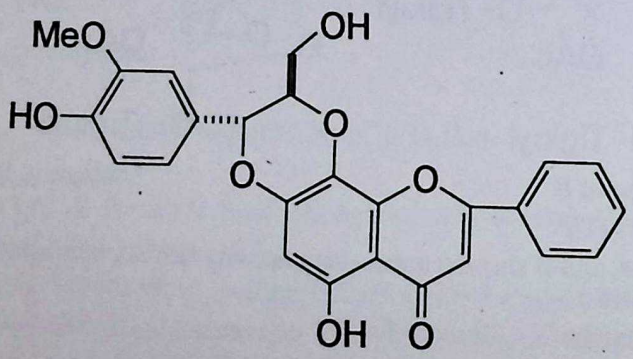
III

S. prostrata Jacq. ex Benth.

Aerial parts of Nepalese plant afforded 2-carboxymethyl-3,5-dihydroxybiphenyl, 2-carboxyethyl-3,5-dihydroxybiphenyl and isoscutellarein-7-O-glucuronoside (*Shoyakugaku Zasshi* 1991, *45*, 345; *Chem. Abstr.* 1992, *116*, 252115 m); 5,6,2',6'-tetrahydroxy-7,8-dimethoxyflavone, 5,6,2'-trihydroxy-7,8,6'-trimethoxyflavone, 5,7,2'-6'trihydroxy-8-methoxyflavone-7-O-β-D-glucuronoside, 2-(3-hydroxy-4-methoxyphenyl)ethyl-1-O-β-D-glucoside and 2-(3-hydroxy-4-methoxyphenyl)ethyl-1-O-β-D-(4-O-feruloyl)glucoside - isolated from roots of Nepalese plant and their structures established; acteoside, leucosceptoside A, wogonin, rivularin, skullcapflavone (I), chrysin, baicalein, scutevulin, oroxylin A also isolated (*Chem. Pharm. Bull.* 1991, *39*, 1047); isolation and structure elucidation of six new flavonoids - scutellaprostins A, B, C, D, E and F from roots (*Chem. Pharm. Bull.* 1991, *39*, 1466).

Distribution : Himalayas, from Kashmir to Kumaon, alt. 2400-4200 m.

NEW COMPOUNDS



Scutellaprostin A

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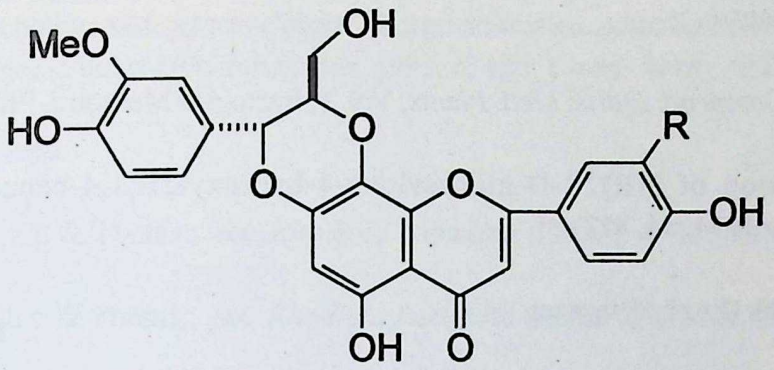
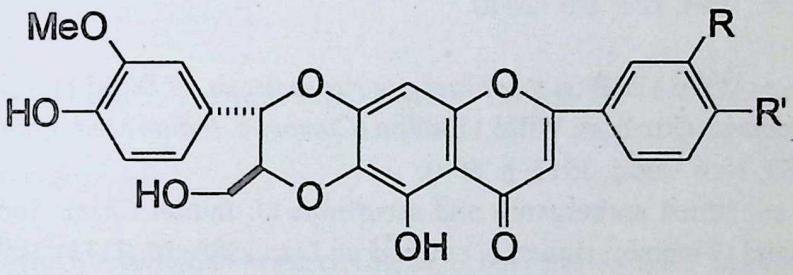


Scutellaprostin B
R = H
Scutellaprostin C
R = OH



Scutellaprostin D
R,R' = H
Scutellaprostin E
R = H, R' = OH
Scutellaprostin F
R,R' = OH

S. rivularis Wall.; see *S. barbata* D. Don

S. scandens Buch.-Ham. ex D.Don syn. *S. angulosa* Benth. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 667).

Two new glycosides isolated from leaves and characterised as 2-(4-hydroxyphenyl)ethyl-(6'-O-sinapoyl)-β-D-glucoside and 4-methoxycarbonylmethylphenyl-(6'-O-sinapoyl)-β-D-glucoside; osmanthuside B, eugenyl-β-D-glucoside, 1-octen-3-ol-β-D-glucoside, 3-epi-oleanolic acid, 6,7- dimethyl-5-benzofuranol, (-)syringaresinol, kobusone, caryophyllenols I and II, clovanediol and 2-methoxyclovanol also isolated (*Shoyakugaku Zasshi* 1993, *47*, 287; *Chem. Abstr*. 1994, *120*, 294088 t).

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SECALE (Poaceae)

S. cereale L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 668).

Isolation of 2(R)2β-D-glucosyloxy-4-hydroxy-2H,1,4-benzoxazin-3(4H)-one (*Phytohemistry* 1994, *35*, 827).

SECURINEGA (Euphorbiaceae)

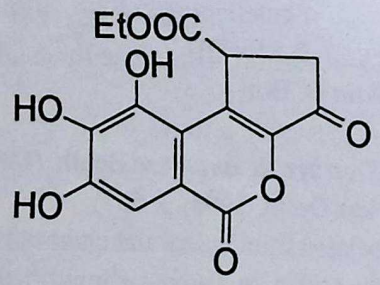
S. suffruticosa (Pall.) Rehder (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 579).

Synthesis of securinine (*Yaoxue Xuebao* 1992, *27*, 349; *Chem. Abstr.* 1992, *117*, 131315w); gallic acid, corilagin, helioscopinin B, geraniin, bergenin, norbergenin, 11-O-galloylnorbergenin, gallocatechin and rutin isolated from leaves (*Saengyak Hakhoechi* 1994, *25*, 105; *Chem. Abstr.* 1994, *121*, 141320 h).

S. virosa (Roxb. ex Willd.) Baillon syn. *Flueggea virosa* (Roxb. ex Willd.) Baillon, *F. microcarpa* Blume, *F. microcarpa* (Roxb. ex Willd.) Baillon (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 669).

Roots contained norbergenin and securinine (*J. Indian Chem. Soc.* 1989, *66*, 494); synthesis of (-) and (+)norsecurinines (*Tetrahedron Lett.* 1989, *30*, 7173); isolation of cytotoxic alkaloids, virosecurinine and viroallosecurinine from leaves (*J. Pharm. Sci.* 1991, *80*, 325); isolation and structure determination of ethylbrevifolin carboxylate from leaves (*Phytochemisty* 1991, *30*, 2435).

NEW COMPOUNDS



Ethylbrevifolin carboxylate

BIOLOGICAL ACTIVITY

A comparison of cytotoxicity of virosecurinine and related hydro derivatives in P-388, HCT-8, KB and A-549 cell lines *in vitro* showed that α-, β-, γ- and δ-unsaturated enone systems are responsible for significant cytotoxicity (*J. Pharm. Sci.* 1991, *80*, 325); oral administration of bergenin to hyperlipidaemic rats for 14 days significantly decreased serum total lipid without much change in serum cholesterol and triglycerides. However, after 21 days administration,

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serum cholesterol, triglycerides, LDL and VLDL-cholesterol levels were significantly reduced while serum HDL-cholesterol level was elevated. Bergenin-treated animals also showed significant decrease in atherogenic index (*Phytother. Res.* 1992, *6*, 180; *Chem. Abstr.* 1993, *118*, 32795 j).

SEDUM (Crassulaceae)

S. crenulatum Hook.f. & Thoms.; see *Rhodiola crenulata* (Hook.f. & Thoms.) Ohba

S. fastigiatum Hook.f. & Thoms.; see *Rhodiola fastigiata* (Hook. & Thoms.) Fu

S. himalense D.Don; see *Rhodiola himalensis* (D. Don) Fu

S. lineare Thunb.

Chrysoeriol, pratensein, 3'-O-methylorobol-7-O-β-D-glucoside, oroboside, tritriacontane and β-sitosterol isolated (*Zhongcaoyao* 1991, *22*, 438; *Chem. Abstr.* 1992, *116*, 102714 s). Distribution : Hills of Uttar Pradesh.

S. sacrum (R.-Hamet) Ohba; see *Rhodiola sacra* (R.-Hamet) Fu

SELINUM (Apiaceae)

S. candollii DC. syn. *S. tenuifolium* Wall. ex Clarke, *S. tenuifolium* Wall. ex Clarke var. *filicifolia* (Edgew.) Clarke, *Cortia wallichiana* (DC.) Leute (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 580).

Isoimperatorin and oxypeucedanin isolated as major positive inotropic constituents from rhizomes of Bhutanese plant (*Nat. Med.* 1994, *48*, 95; *Chem. Abstr.* 1994, *121*, 297143 p).

S. tenuifolium Wall. ex Clarke; see *S. candollii* DC.

S. tenuifolium Wall. ex Clarke var. *filicifolia* (Edgew.) Clarke; see *S. candollii* DC.

SEMECARPUS (Anacardiaceae)

S. anacardium L.f. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 670).

A new biflavanone - anacarduflavanone - isolated from nut shells and its structure established (*Chim. Acta Turc.* 1992, *20*, 33; *Chem. Abstr.* 1993, *118*, 120937 n).

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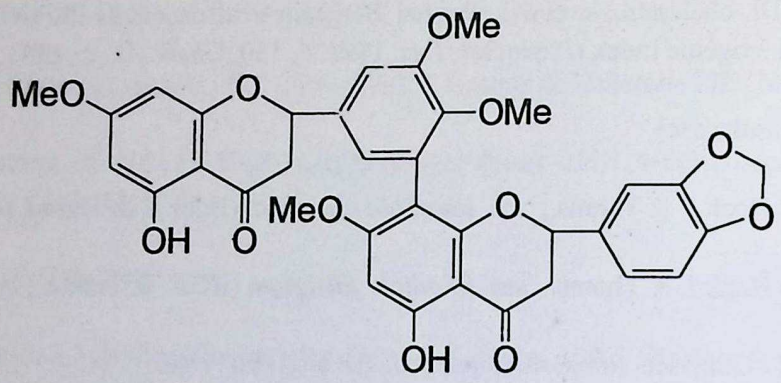
NEW COMPOUNDS



Anacarduflavanone

S. kurzii Engler (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 670).

Apigenin-6C-galactoside isolated from air-dried leaves (*J. Chem. Res. Synop.* 1990, 80; *Chem. Abstr.* 1990, *112*, 213887 n); kaempferol-3-O-β-D-glucoside-4'-O-α-L-rhamnoside together with quercetin-3-O-rhamnoside and apigenin-7-O-neohesperidoside isolated from leaves (*Fitoterapia* 1991, *62*, 342); leaves afforded scutellarein-7-O-β-D-xylosyl(1→6)-β-D-galactoside (*Fitoterapia* 1993, *64*, 239).

SENEBIERA (Brassicaceae)

S. didyma (L.) Pers.; see *Coronopus didymus* (L.) Smith

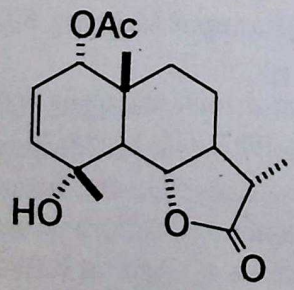
S. pinnatifida DC.; see *Coronopus didymus* (L.) Smith

SENECIO (Asteraceae)

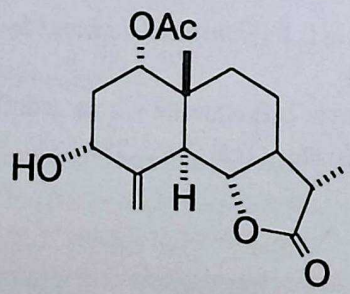
S. chrysanthemoides DC. syn. *S. jacobaea* D.Don (*Compend. Indian Med. Plants*. Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 582).

New eudesmanolides - chrysanthemolide and 1-acetylerivanin - isolated from aerial parts and characterised (*Phytochemistry* 1991, *30*, 2329).

NEW COMPOUNDS



Chrysanthemolide



1-Acetylerivanin

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S. coronopifolius Desf.

Angelic acid, 6-hydroxytremetone and 6-hydroxyeuparin isolated from aerial parts (*Pharmazie* 1990, *45*, 381; *Chem. Abstr.* 1990, *113*, 112532 h).

Distribution : Western Himalayas, from Kashmir to Himachal Pradesh, alt. 2400-5000 m.

S. jacobaea D.Don; see *S. chrysanthemoides* DC.

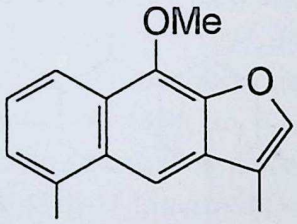
S. ligularia Hook.f.; see *Ligularia sibirica* (L.) Cass.

S. linifolius Clarke

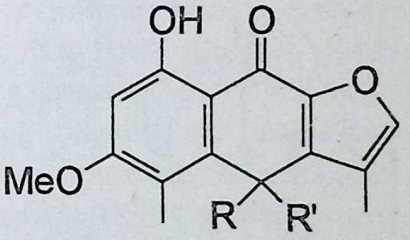
Four new furanoeremophilane sesquiterpenes (I, II, III and IV) isolated and characterised as 14-nor-dehydrocacalohastine, 8-hydroxy-6-methoxy-3,4,5-trimethylnaphtho [2,3-b]furan-9(4H)-one, 4,8-dihydroxy-6-methoxy-3,4,5-trimethylnaphtho[2,3-b]furan-9(4H)-one and 8-hydroxy-6-methoxy-3,5-dimethylnaphtho[2,3-b]furan-4,9-dione respectively; angelic acid and maturinone also isolated (*Phytochemistry* 1989, *28*, 3093).

Distribution : Khasi hills, alt. 1200-2100 m.

NEW COMPOUNDS



I



II
R = Me, R' = H
III
R = Me, R' = OH
IV
RR' = O

S. nudicaulis Buch.-Ham. ex D.Don syn. *Rugelia nudicaulis* Schuttlew. ex Chapm. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 582).

A furanoeremophilane derivative isolated and characterised as 3α,6β-bis-(angeloyloxy)furanoeremophilane-15-carboxylic acid; γ-humulene also isolated (*Pharmazie* 1993, *48*, 69; *Chem. Abstr.* 1993, *118*, 197881 x).

S. vulgaris L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 671).

Isolation of senecionine, seneciphylline and retronecine (*Acta Pharm. Nord.* 1990, *2*, 343; *Chem. Abstr.* 1991, *114*, 118530 y); stereoselective synthesis of (+)usaramine (*J. Org. Chem.* 1992, *57*, 2270); synthesis of (+)retronecine (*Synlett* 1994, 277; *Chem. Abstr.* 1994, *121*, 35938 f).

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SENNA (Caesalpiniaceae)

S. multiglandulosa (Jacq.) Irwin & Barneby; see *Cassia tomentosa* L.f.

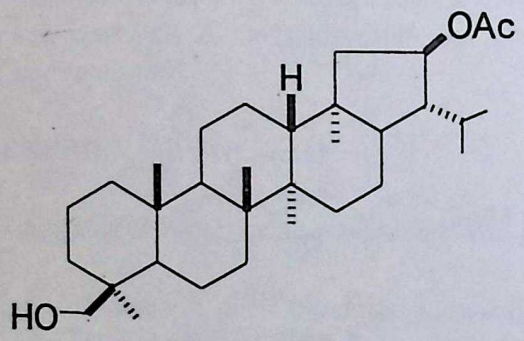
SERICOSTOMA (Boraginaceae)

S. pauciflorum Stocks ex Wight

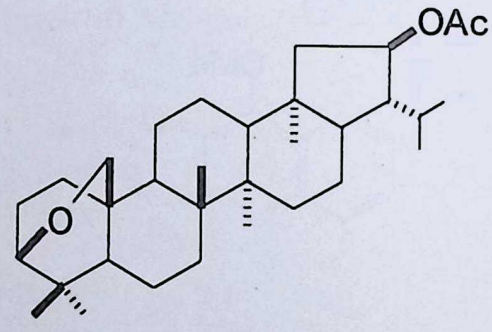
A new fernane-type triterpene - sericostinyl acetate - isolated and its structure determined; α-amyrin, β-amyrin and its acetate also isolated (*J. Nat. Prod.* 1991, *54*, 570); a new triterpene - pauciflorol acetate - isolated and characterised as 3β,25-epoxy-hopane-20β-yl-acetate (*Phytochemistry* 1992, *31*, 2899); another new hopane type triterpene - pauciflorinyl acetate - isolated and characterised as hopan-24-ol-20β-yl acetate; β-sitosterol also isolated (*Fitoterapia* 1992, *63*, 304).

Distribution : Gujarat,coastal regions.

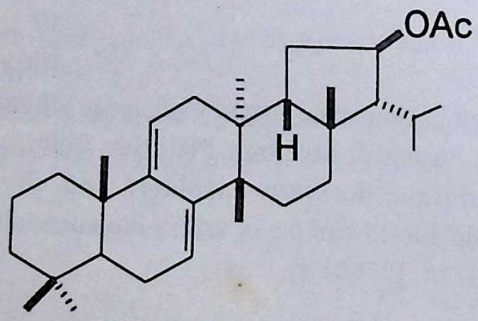
NEW COMPOUNDS



Pauciflorinylacetate



Pauciflorol acetate



Sericostinyl acetate

SERIPHIDIUM (Asteraceae)

S. brevifolium (Wall.) Y. Ling & Y.R. Ling; see *Artemisia maritima* L.

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SESAMUM (Pedaliaceae)

S. indicum L.; see *S. orientale* L.

S. laciniatum Klein. ex Willd.

Tam. - Kattu-ellu.

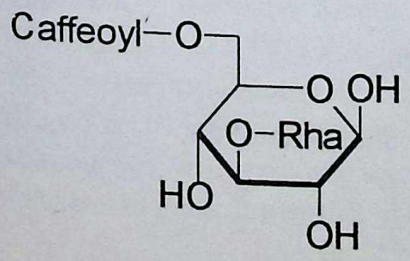
Methyl 2α,3β,24-trihydroxyolean-12-en-28-oate along with methyl 2α,3β-diacetoxyolean-12-en-28-oate, methyl 2α,3β,23-trihydroxyolean-12-en-28-oate and methyl 1α,2α,3β,23-tetrahydroxyolean-12-en-28-oate from flowering leaves (*Indian J. Chem.* 1991, *30*B, 769).

Distribution : Peninsular India.

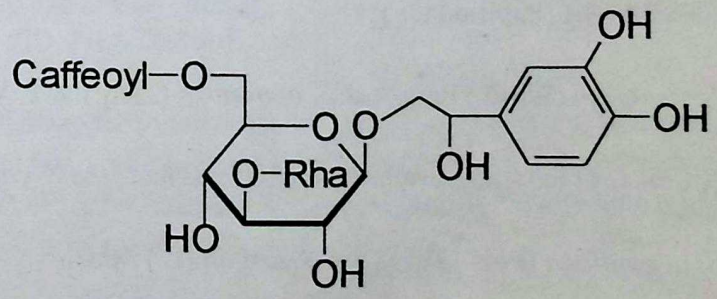
S. orientale L. syn. *S. indicum* L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 671).

Two new phenylethanoid glycosides (I and II) and three new triglycosides (III, IV and V) isolated from whole plant and characterised; in addition, acteoside and its isomer, decaffeoyl acteoside, cistanoside F, campneoside I and campneoside II also isolated (*Phytochemistry* 1993, *34*, 729); seed oil afforded new lignanphenol - sesaminol - together with pinoresinol and sesamolinol (*ACS Symp. Ser.* 1994, *547*, 264; *Chem. Abstr.* 1994, *120*, 162084 d; *Phytochemistry* 1994, *35*, 773); in addition, three new sesaminol glucosides (VI, VII and VIII) isolated from seeds (*Phytochemistry* 1994, *35*, 773); sesamolinol, sesaminol and pinoresinol isolated from seeds and found to exist as their glucosides; other lignan glucosides isolated and characterised as pinoresinol-4'-O-β-D-glucosyl(1→6)-β-D-glucoside (KP1) and pinoresinol-4'-O-β-D-glucosyl(1→2)-β-D-glucoside (KP2) (*ACS Symp. Ser.* 1994, *547*, 275; *Chem. Abstr.* 1994, *120*, 162156 d); another lignan triglucoside, KP3, isolated from seeds and its structure established as pinoresinol-4'-O-β-D-glucosyl(1→2)-O-[β-D-glucopyranosyl(1→6)]-β-D-glucoside (*Heterocycles* 1993, *36*, 933; *ACS Symp. Ser.* 1994, *547*, 275; *Chem. Abstr.* 1994, *120*, 162156 d); sesamolin and sesamin identified in seed oil by GC-MS and HPLC (*J. Am. Oil Chemists Soc.* 1994, *71*, 141; *Chem. Abstr.* 1994, *120*, 189985 k); isolation of two triterpenes - esculentic acid and 3β-(trans-p-coumaroyloxy)-2α,23-dihydroxyurs-12-en-28-oic acid (IX) - from callus cells (*Shokubutsu Soshiki Baiyo* 1994, *11*, 145; *Chem. Abstr.* 1994, *121*, 200901 y);

NEW COMPOUNDS



I



II

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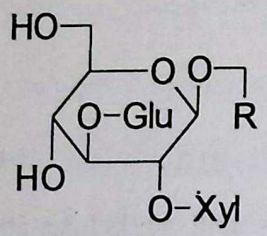
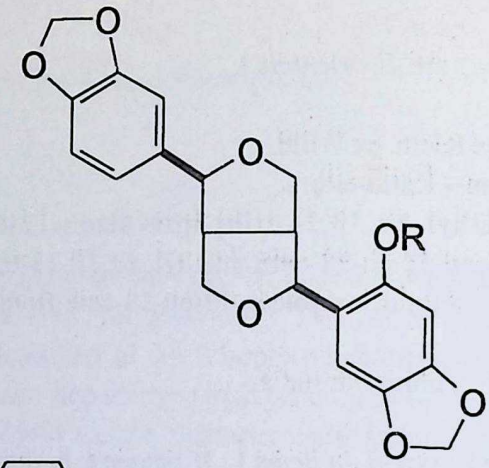
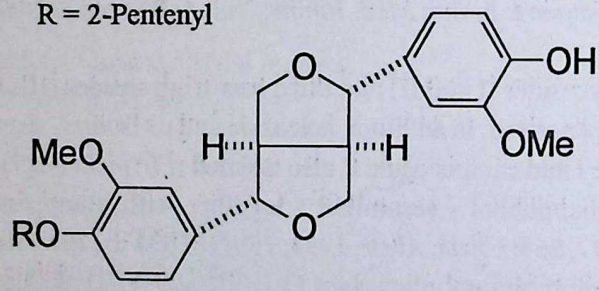


III
R = Benzyl
IV
R = Phenyl
V
R = 2-Pentenyl



Sesaminol
R = H
VI
R = Glu
VII
R = Glu(2→1)Glu
VIII
R = Glu[(2→1)Glu](6→1)Glu



KP3
R = Glu[(2→1)Glu](6→1)Glu

BIOLOGICAL ACTIVITY

Lignan glucoside, KP3, *in vitro* prevented oxidation of linoleic acid in aqueous solution and of rabbit red cell ghost membrane by tert.-butyl hydroperoxide (Jpn. 6,116,282 (1994) Apr. 26; *Chem. Abstr.* 1994, *121*, 104370 d); sesamolinol and sesaminol showed antioxidant activity (*ACS Symp. Ser.* 1994, *547*, 264; *Chem. Abstr.* 1994, *120*, 162084 d); glucosides KP1, KP2 and KP3 exhibited antioxidant activity (*ACS Symp. Ser.* 1994, *547*, 275; *Chem. Abstr.* 1994, *120*, 162156 d); esculentic acid and dihydroxyursolic acid derivative (IX) inhibited Epstein-Barr virus activation in Raji cells induced by 12-O-tetradecanoylphorbol-13-acetate in short-term (*in vitro*) assay (*Shokubutsu Soshiki Baiyo* 1994, *11*, 145; *Chem. Abstr.* 1994, *121*, 200901 y).

SESBANIA (Papilionaceae)

S. aculeata (Willd.) Pers.; see *S. bispinosa* (Jacq.) W.F. Wight

S. aculeata Pers. var. *cannabina* (Retz.) Baker; see *S. cannabina* (Retz.) Poir.

S. aegyptiaca (Poir.) Pers.; see *S. sesban* (L.) Merr.

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S. bispinosa (Jacq.) W.F. Wight syn. *S. aculeata* Pers. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 226).

A branched galactomannan containing galactose and mannose in molar ratio of 1.0:1.9 isolated from seeds and partially characterised (*Indian J. Chem.* 1989, *28*B, 928).

S. cannabina (Retz.) Poir. syn. *S. aculeata* Pers. var. *cannabina* (Retz.) Baker (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 623).

Glucose, fructose, sucrose, erythritol, arabinitol, galactitol and myo-inositol identified in bark and stem extract (*J. Bangladesh Chem. Soc.* 1992, *5,* 37; *Chem. Abstr.* 1992, *117,* 167676 w).

S. sesban (L.) Merr. syn. *S. aegyptiaca* (Poir.) Pers. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 672).

Kaempferol-3-O-α-L-rhamnosyl(1→2)-[α-L-rhamnosyl(1→6)]-β-D-galactoside (I) isolated (*Pharmazie* 1991, *46,* 679; *Chem. Abstr.* 1992, *116,* 190994 m).

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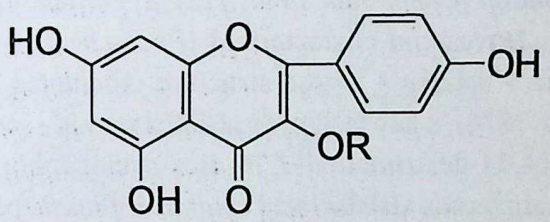

I

R = Gal[(2→1)Rha](6→1)Rha

BIOLOGICAL ACTIVITY

Kaempferol trisaccharide (I) exhibited tumor inhibitory activity (*Pharmazie* 1991, *46,* 679; *Chem. Abstr.* 1992, *116,* 190994 m).

SESELI (Apiaceae)

S. daucifolium Clarke; see *Cnidium monnieri* (L.) Cusson

S. diffusum (Roxb. ex Sm.) Sant. & Wagh syn. *S. indicum* Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 623).

BIOLOGICAL ACTIVITY

Seselin possessed significant dose-dependent anti-inflammatory activity in carrageenin-induced acute inflammation in rats, but was ineffective in formaldehyde-induced subacute inflammation. It also showed significant analgesic effect in acetic acid-induced writhing and hot plate tests in mice. It was safe upto 6.0 g/kg (oral) in mice (*Fitoterapia* 1990, *61,* 360).

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S. indicum Wt. & Arn.; see *S. diffusum* (Roxb. ex Sm.) Sant. & Wagh

S. monnieri L.; see *Cnidium monnieri* (L.) Cusson

SETARIA (Poaceae)

S. italica (L.) P. Beauv. syn. *Panicum italicum* L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 585).

Two new C-glycosylflavones - scoparin-2"-O-xyloside and scoparin-2"-O-glucoside - from leaves and their characterisation; orientin-(6"-O-(E)ferulyl)-2"-O-xyloside, orientin-(O-(E)ferulyl)-2"-O-glucoside, vitexin-(O-(E)ferulyl)-2"-O-xyloside, vitexin-(O-(E)ferulyl)-2"-O-glucoside and vitexin-(O-(E)sinapyl)-2"-O-xyloside isolated and partly characterised; in addition, apigenin-7-(p-coumaryl)rutinoside, luteolin-7-rutinoside, chrysoeriol-7-glucoside and 7-rutinoside, tricin-7-glucoside and 7-rutinoside, vitexin, its 2"-O-xyloside and 2"-O-glucoside, orientin, its 2"-O-xyloside and 2"-O-glucoside, isoorientin and scoparin also obtained (*Phytochemistry* 1989, *28,* 2471); isolation of a new flavone glycoside - setaricin - from leaves and its structure determination (*Chem. Ind.* 1989, 422); 8,3'-dimethoxy-5,4'-dihydroxyflavone-7-glucoside isolated from leaves and characterised (*Phytochemistry* 1991, *30,* 1345); leaves afforded a new coumarin - setarin - whose structure elucidated as 4-propenoxycoumarin (*Phytochemistry* 1991, *30,* 3826); a new polyhydroxylated steroid - setariol - isolated from leaves and characterised as 4,14,24-destrimethyl-7,20-dien-cycloeuphordane-3α,14α,26-triol; β-sitosterol, β-amyrin and taraxerone also isolated (*Indian J. Pharm. Sci.* 1992, *54,* 83).

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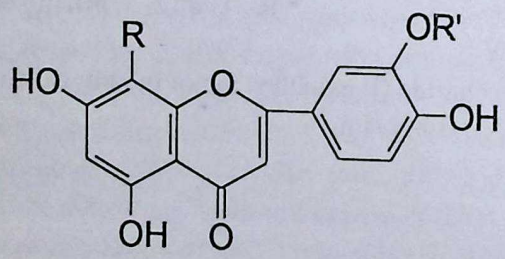

Scoparin-2"-O-xyloside
R = Glu(2→1)Xyl, R' = Me
Scoparin-2"-O-glucoside
R = Glu(2→1)Glu, R' = Me
Orientin-(6"-O-(E)ferulyl)-2"-O-xyloside
R = Glu(6'-O-(E)ferulyl)(2→1)Xyl, R' = H
Orientin-(O-(E)ferulyl)-2"-O-glucoside
R = Glu(O-(E)ferulyl)(2→1)Glu, R' = H

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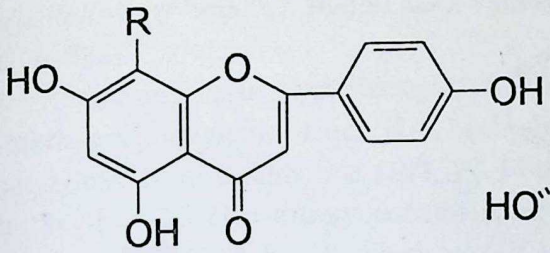
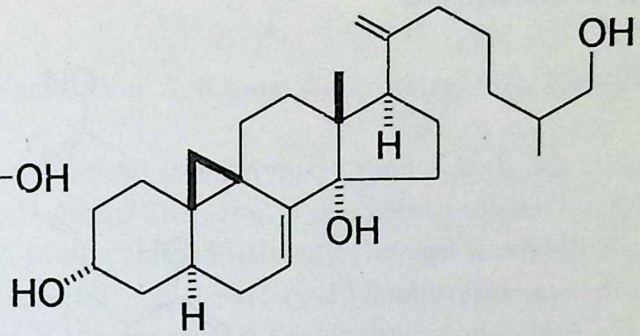
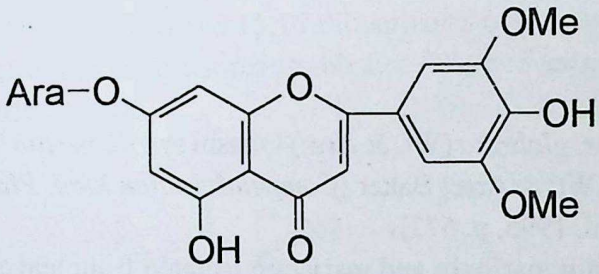


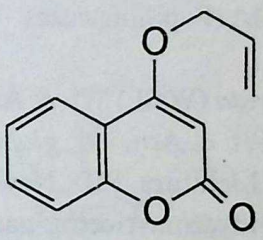


Vitexin-(O-(E)ferulyl)-2"-O-xyloside
R = Glu(O-(E)ferulyl)(2→1)Xyl
Vitexin-(O-(E)ferulyl)-2"-O-glucoside
R = Glu(O-(E)ferulyl)(2→1)Glu
Vitexin(O-(E)sinapyl)-2"-O-xyloside
R = Glu(O-(E)sinapyl)(2→1)Xyl

Setariol



Setaricin



Setarin

SHOREA (Dipterocarpaceae)

S. robusta Gaertn.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 673).

Isolation of bergenin (*Indian Drugs* 1989, *26,* 574); chemical studies on hemicellulose from plant (*Orient. J. Chem.* 1989, *5,* 258; *Chem. Abstr.* 1991, *114,* 182020 j); a new benzofuran - shoreaphenol - isolated from bark and its structure established (*Phytochemistry* 1992, *31,* 2561); isolation of 2α,3β,23-trihydroxy-11β-methoxyurs-12-en-28-oic acid from resin along with ursolic acid, 2α,3β- and 2α,3α-dihydroxyurs-12-en-28-oic acids, 3β,23-dihydroxyolean-12-en-28-oic acid and 2α,3β,23-trihydroxyurs-12-en-28-oic acid (*Phytochemistry* 1993, *32,* 466); resin afforded 3β-acetoxy-28-nor-urs-12-ene together with ursaldehyde, its acetate and 3β-hydroxy-28-nor-urs-12-ene (*Phytochemistry* 1994, *35,* 1073).

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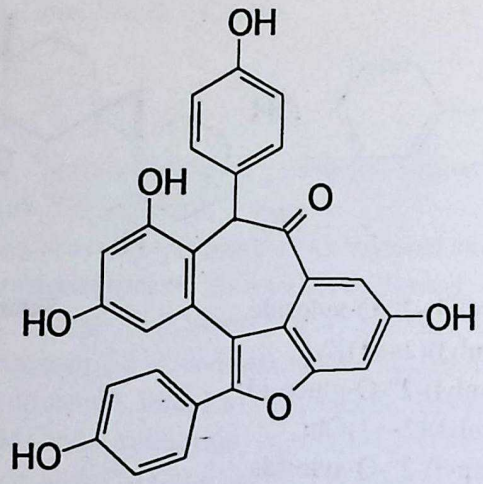

Shoreaphenol

SHUTERIA (Papilionaceae)

S. involucrata (Wall.) Wt. & Arn. var. *glabrata* (Wt. & Arn.) Ohashi syn. *S. vestita* Wt. & Arn., *S. vestita* Wt. & Arn. var. *glabrata* (Wt. & Arn.) Baker (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 673).

Dihydromyricetin, naringenin, naringin and myricetin isolated from leaves (*J. Indian Chem. Soc.* 1991, *68,* 428).

S. vestita Wt. & Arn.; see *S. involucrata* (Wall.) Wt. & Arn. var. *glabrata* (Wt. & Arn.) Ohashi

S. vestita Wt. & Arn. var. *glabrata* (Wt. & Arn.) Baker; see *S. involucrata* (Wall.) Wt. & Arn. var. *glabrata* (Wt. & Arn.) Ohashi

SIDA (Malvaceae)

S. acuta Burm.f. ssp. *acuta* syn. *S. carpinifolia* sensu Masters (non L.f.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 674).

Isolation of heraclenol, β-sitosterol, daucosterol and syringin from whole plant (*Zhongguo Zhongyao Zazhi* 1993, *18,* 681; *Chem. Abstr.* 1994, *120,* 240070 n).

S. carpinifolia L.f.; see *S. acuta* Burm.f. ssp. *acuta*

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SIEGESBECKIA (Asteraceae)

S. orientalis L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 586).

Nine new germacranolides - 9β-hydroxy-8β-isobutyryloxycostunolide (I), 9β-hydroxy-8β-methacryloxycostunolide (II), 14-hydroxy-8β-isobutyryloxycostunolide (III), 8β-isobutyryloxy-14-al-costunolide (IV), 9β,14-dihydroxy-8β-isobutyryloxycostunolide (V), 8β-isobutyryloxy-1β,10α-epoxycostunolide (VI), 9β-hydroxy-8β-isobutyryloxy-1β,10α-epoxycostunolide (VII), 8β,9β-dihydroxy-1β,10α-epoxy-11β,13-dihydrocostunolide (VIII), 14-hydroxy-8β-isobutyryloxy-1β,10α-epoxycostunolide (IX); three melampolides - 15-hydroxy-9α-acetoxy-8β-isobutyryloxy-14-oxo-melampolide (X), 9α,15-dihydroxy-8β-isobutyryloxy-14-oxo-melampolide (XI), 15-hydroxy-8β-isobutyryloxy-14-oxo-melampolide (XII); three geranylnerol derivatives - 19-acetoxy-12-oxo-10,11-dihydrogeranylnerol (XIII), 19-acetoxy-15-hydroperoxy-12-oxo-13,14(E)-dehydro-10,11,14,15-tetrahydrogeranylnerol (XIV), 19-acetoxy-15-hydroxy-12-oxo-13,14(E)-dehydro-10,11,14,15-tetrahydrogeranylnerol (XV); along with three ent-pimarenes - 2β,15,16-trihydroxy-ent-pimar-8(14)-ene (XVI), 15,16,18-trihydroxy-2-oxo-ent-pimar-8(14)-ene (XVII) and 15,16-dihydroxy-2-oxo-ent-pimar-8(14)-ene (XVIII) isolated from aerial parts and their structures established (*Phytochemistry* 1991, *30,* 1579).

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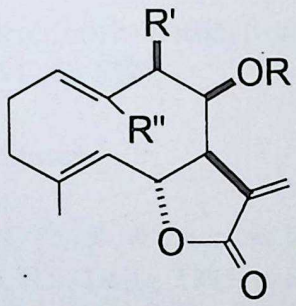

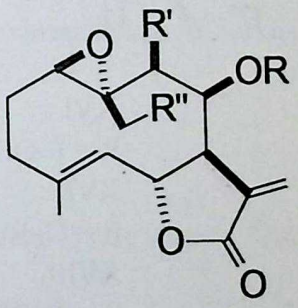

I
R = Isobutyryl, R' = OH, R" = Me

II
R = Methacryloyl, R' = OH, R" = Me

III
R = Isobutyryl, R' = H, R" = CH_2OH

IV
R = Isobutyryl, R' = H, R" = CHO

V
R = Isobutyryl, R' = OH, R" = CH_2OH

VI
R = Isobutyryl, R',R" = H

VII
R = Isobutyryl, R' = OH, R" = H

VIII
R, R" = H, R' = OH

IX
R = Isobutyryl, R' = H, R" = OH

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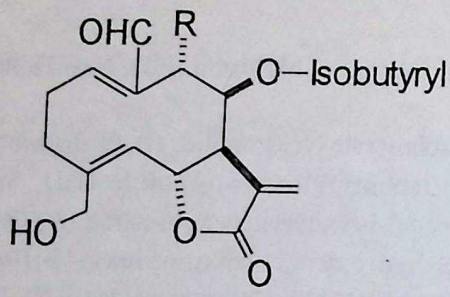
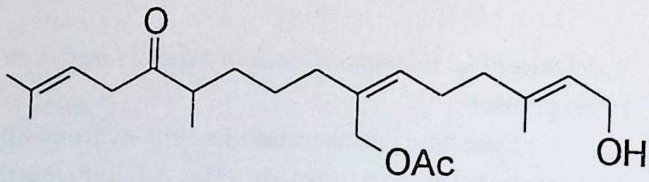
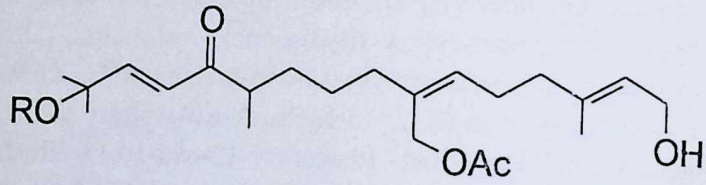


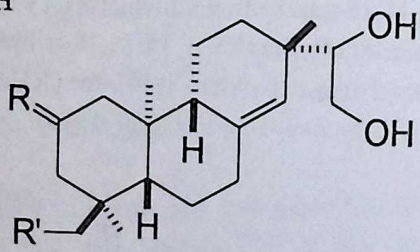


XIII

X
R = OAc
XI
R = OH
XII
R = H



XIV
R = OH
XV
R = H



XVI
R = β-OH,H, R' = H
XVII
R = O, R' = H
XVIII
R = O, R' = OH

SILYBUM (Asteraceae)

S. marianum (L.) Gaertn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 675).

Kaempferol, its 3-O-α-rhamnoside and 3-O-α-rhamnosyl-7-O-galacturonide, 7-O-glucoside, 7-O-galactoside, 7-O-(2"-O-α-rhamnosyl)galacturonide and 7-O-glucuronide-6"-ethyl ether of apigenin isolated from flowers (*Phytochemistry* 1989, *28,* 1751); total synthesis silychristin (*Chem. Pharm. Bull.* 1989, *37,* 1441); mass spectra of silybin, isosilybin, silychristin (silymarin II), silydianin (Silybum substance E5) and taxifolin (*Nat. Prod. Lett.* 1994, *4,* 247; *Chem. Abstr.* 1994, *121,* 255445 h).

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BIOLOGICAL ACTIVITY

Flavanolignans (silychristin, silydianin, silybin and isosilybin) inhibited lipid peroxidation in rat liver microsomes and freshly isolated hepatocytes in concentration-dependent manner. In hepatocytes, lipid peroxidation was induced by ADP/Fe^{3+} complex and cell damage was evaluated as LDH activity released in medium (*Pharmacol. Res.* 1992, *25,* 147; *Chem. Abstr.* 1992, *116,* 248373 b); effects of silymarin on liver cell damage induced by ischemia studied in rats fasted for 24 hr. Silymarin (100 mg/kg, i.v.) administered 5 min before induction of ischemia and restoration of blood flow (*in vivo* ischemia) and at 1 hr and at 5 min before sacrifice (*in vitro* ischemia). Serum amino-transferase activity after 24 hr reperfusion was significantly reduced and extent of necrosis decreased in silmarin-treated group (*Virchows Arch.* 1993, *64*B, 259; *Chem. Abstr.* 1994, *120,* 261287 d); administration of silymarin (20.0 mg/kg, p.o.) to partially hepatectomized rats for 7 consecutive days caused increase in levels of DNA, RNA, protein and cholesterol in regenerating liver, maximum increase being between 18 to 72 hr post-partial hepatectomy. DNA and RNA synthesis was increased, being mximum at 24 hr. Results suggest that silymarin stimulates liver regeneration in early stages (*Indian J. Pharmacol.* 1994, *26,* 19).

SISYMBRIUM (Brassicaceae)

S. irio L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 373).

Quercetin, isorhamnetin, β-sitosterol and its glucoside isolated from aerial parts (*J. Indian Chem. Soc.* 1991, *68,* 532).

SKIMMIA (Rutaceae)

S. laureola (DC.) Sieb. & Zucc. ex Walp. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 677).

Isolation of geijerene, pregeijerene, linalool and linalyl acetate from essential oil (*Indian Perfum.* 1992, *36,* 217; *Chem. Abstr.* 1994, *121,* 42372 v).

BIOLOGICAL ACTIVITY

Skimmianine selectively inhibited 5-hydroxytryptamine-induced vasopressor responses in rats as well as in isolated atria. It produced nonspecific blockade of cardiovascular functions at higher concentration (*Arch. Int. Pharmacodyn. Ther.* 1990, *306,* 65; *Chem. Abstr.* 1991, *114,* 74949 k).

SMILAX (Smilacaceae)

S. aspera L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 629).

Rutin isolated as major flavonoid from plant collected in Croatia (*Farm.Glas.* 1993, *49,* 99; *Chem. Abstr.* 1993, *119,* 91283 j).

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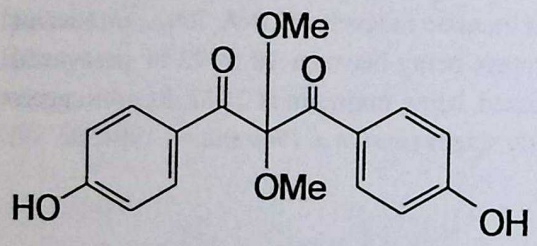
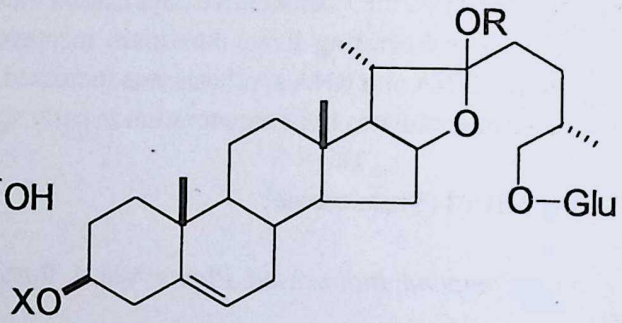
S. china L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 591).

A new compound - smilaxin - isolated from roots and its structure established (*Shanghai Yike Daxue Xuebao* 1989, *16,* 222; *Chem. Abstr.* 1990, *112,* 83930 h); two new furostanol glycosides (I and II) isolated from rhizomes and characterised (*Saengyak Hakhoechi* 1989, *20,* 145; *Chem. Abstr.* 1990, *112,* 155262 s); isolation of a new glycoside (III) and its characterisation as isonarthogenin-3-O-α-L-rhamnosyl(1→2)-O-[α-L-rhamnosyl(1→4)]-β-D-glucoside; in addition two furostane and one spirostane glycosides also isolated (*Phytochemistry* 1992, *31,* 2439).

NEW COMPOUNDS

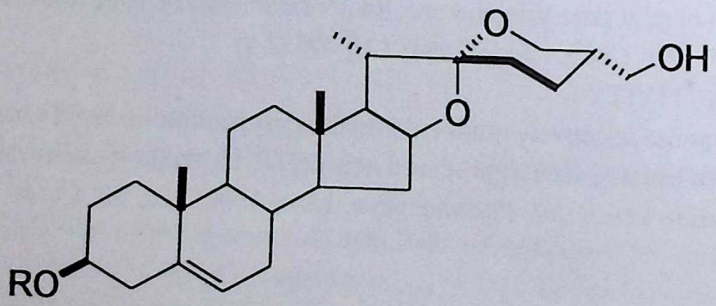


Smilaxin



X = Glu(2→1)Rha

I
R = Me
II
R = H



III
R = Glu[(2→1)Rha](4→1)Rha

S. elegans Wall. ex Hook.f.; see *S. menispermoidea* DC.

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S. menispermoidea DC. syn. *S. elegans* Wall. ex Hook.f.

A new steroidal saponin (I) isolated from rhizomes and its structure elucidated as 25(S)-spirost-5-en-3β,17α,27-triol-3-O-[α-L-rhamnopyranosyl(1→2)][α-L-rhamnopyrano-syl(1→4)]-β-D-glucopyranoside; in addition, dioscin, methyl protodioscin and pseudo-protodioscin also isolated (*Phytochemistry* 1992, *31,* 1349); another new saponin (II) from roots and characterised as 25(S) spirost-5-en-3β,17α,27-triol-3-O-α-L-rhamnopyranosyl(1→4)-β-D-glucoside (*Chinese Chem. Lett.* 1993, *4,* 137; *Chem. Abstr.* 1994, *120,* 319337 p); diosgenin, its 3-O-acetate, β-sitosterol, daucosterol, 3,5,4'-trihydroxydiphenylethylene and 3,5,3',4'-tetrahydroxy-diphenylethylene isolated from roots (*Zhongguo Zhongyao Zazhi* 1993, *18,* 611; *Chem. Abstr.* 1994, *120,* 73460 f).

Distribution: Himalayas, Garhwal to Sikkim, alt. 1600-3400 m.

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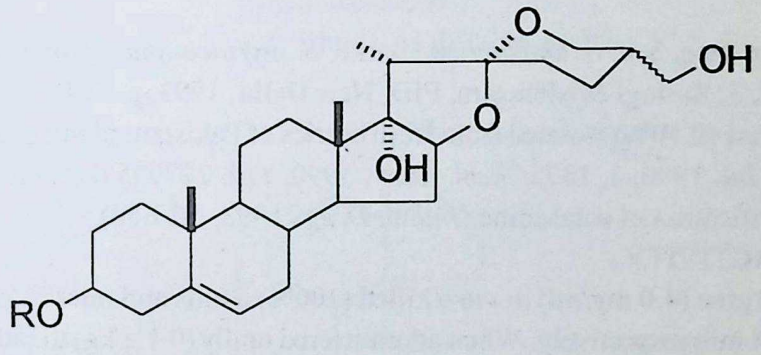

I
R = [Glu(2→1)Rha](4→1)Rha, ~~ = α
II
R = Glu(4→1)Rha, ~~ = β

SMYTHEA (Rhamnaceae)

S. bombaiensis (Dalz.) Banerjee & Mukherjee syn. *Ventilago bombaiensis* Dalz.

A new compound - tetracosanolide - isolated from stem bark and its structure determined; in addition, chrysophanol, its 8-methyl ether, 10-(chrysophanol-7'-yl)-10-hydroxychrysophanol-9-anthrone, citreorosein, emodin, its 1-O-β-L-rhamnoside, islandicin, physcion, its 8-methyl ether, ventiloquinones C and O, xanthorin, calyxanthone, lupeol, β-sitosterol and its glucoside isolated (*Phytochemistry* 1992, *31,* 2103).

Distribution: Western ghats, region of Maharashtra

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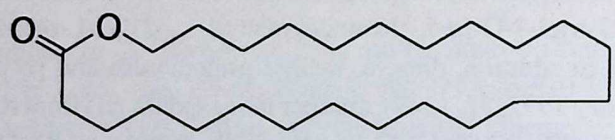

Tetracosanolide

SOJA (Papilionaceae)

S. hispida Moench; see *Glycine max* (L.) Merr.

SOLANUM (Solanaceae)

S. aculeatissimum Jacq. syn. *S. khasianum* Clarke, *S. myriacanthum* Dunal (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 591).

Solasonine (0.70%) isolated from fresh berries of Pakistani plant; seeds contained fixed oil (4.47%) (*Sci. Int.* 1990, *2,* 137; *Chem. Abstr.* 1990, *113,* 227995 d); a process developed for isolation and purification of solasodine (*Indian Drugs* 1993, *30,* 650).

BIOLOGICAL ACTIVITY

Solamargine (4.0 mg/ml) *in vitro* killed (100%) adults and microfilaria (mf) of *Setaria cervi* in 60 and 88 min respectively. When administered orally (0.1 g/kg) to rats, in which *S. cervi* was implanted i.p., it reduced blood mf count by more than 30% after first phase of treatment of 10 days. Mf count showed increase of 72% after second phase of treatment. Following third and fourth phases of treatments mf d. was reduced by more than 90%; 100% reduction was obtained 15 day after fourth and final phase of treatment which was of 5 days duration. At 0.1 g/kg x 4 phases, it killed 100% of adult worms without incident toxicity (*Int. J. Pharmacog.* 1994, *32,* 184; *Chem. Abstr.* 1994, *121,* 221125 p).

S. biflorum Lour.; see *Lycianthes biflora* (Lour.) Bitt. ssp. *biflora*

S. dulcamara L. syn. *S. persicum* Willd. ex R. & S., *S. lyratum* Thunb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 678).

3-O-Glucosides and 3-O-rhamnoglucosides of quercetin and kaempferol isolated from flowers and leaves (*Herba Pol.* 1990, *36,* 133; *Chem. Abstr.* 1992, *116,* 231873 s); isolation of two new spirostane glycosides - soladulcosides A and B - from aerial parts and their structure elucidation (*Chem. Pharm. Bull.* 1991, *39,* 1626); two new spirostanol glycosides - tigogenin-3-O-solatrioside and degalactotigonin - and two spirosolane glycosides - soladulcines A and B - from aerial parts and their characterisation (*Chem. Pharm. Bull.* 1994, *42,* 707); atractylenolide I, dehydrocarissone, ergosterol peroxide and 9,11-dehydroergosterol peroxide isolated (*Arch. Pharmacal Res.* 1994, *17,* 1; *Chem. Abstr.* 1994, *120,* 294161 m).

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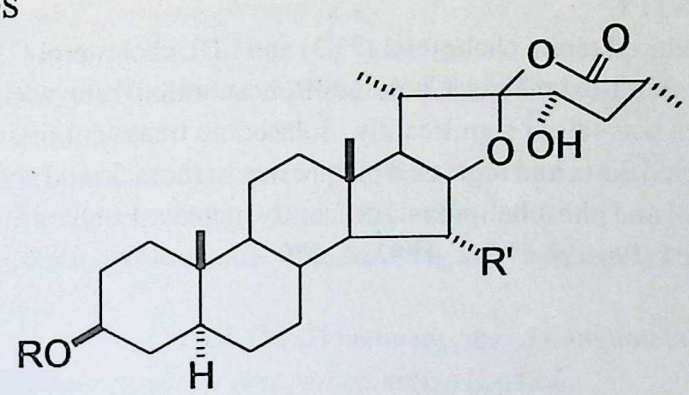
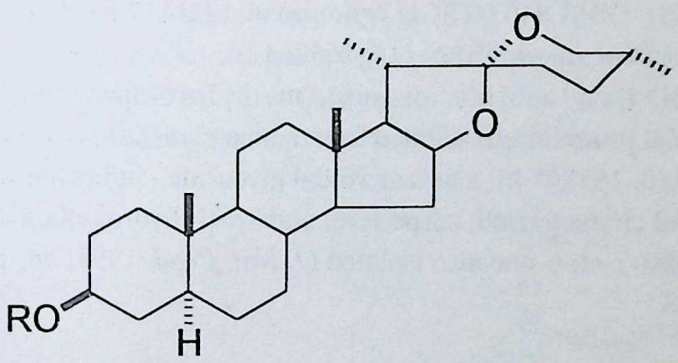
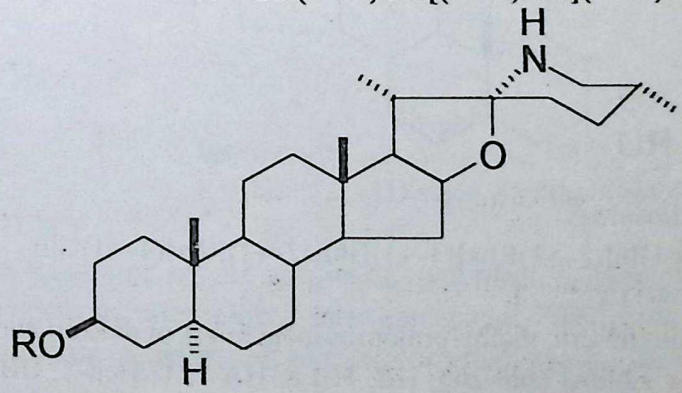
NEW COMPOUNDS



Soladulcoside A
R = Glu(2→1)Rha, R' = OH
Soladulcoside B
R = Glu[(2→1)Rha](4→1)Rha, R' = H



Tigogenin-3-O-solatrioside
R = Gal(4→1)Glu(2→1)Glu
Degalactotigonin
R = Gal(4→1)Glu[(2→1)Glu](3→1)Xyl



Soladulcine A
R = Glu[(2→1)Rha](4→1)Rha
Soladulcine B
R = Gal(4→1)Glu[(2→1)Glu](3→1)Xyl

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BIOLOGICAL ACTIVITY

Solasodine reduced serum cholesterol (73.3) and LDL cholesterol (73.5%) and prevented atherogenesis in cholesterol-fed rabbits. Cholesterol/phospholipid ratio was decreased (42.02%) while HDL-cholesterol was raised significantly. Solasodine treatment prevented accumulation of cholesterol in liver and aorta and regressed plaque size in thoracic and abdominal aorta. Fecal excretion of cholesterol and phospholipids significantly increased suggesting that modulation of absorption was affected (*Phytother. Res.* 1992, *6,* 270; *Chem. Abstr.* 1993, *118,* 52227 d).

S. incanum L.; see *S. melongena* L. var. *incanum* (L.) O. Ktze.

S. indicum L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 595).

Both chloroform-soluble and insoluble fractions of ethanolic extract showed cytotoxicity to colo-205 (colon), KB (nasopharynx), HeLa (uterine cervix), HA 22T (hepatoma), Hep-2 (laryngeal epidermoid), GBM 8401/TSGH (glioma) and H1477 (melanoma) cells (*Anticancer Res.* 1991, *11,* 1911; *Chem. Abstr.* 1992, *116,* 165861 h).

β-Sitosterol, its glucoside, dioscin, methylprotoprosapogenin A of dioscin, methylprotodioscin and protodioscin isolated from whole plant (*Anticancer Res.* 1991, *11,* 1911; *Chem. Abstr.* 1992, *116,* 165861 h); a new steroidal glycoside - indioside A - isolated from fruits of Formosan plant and characterised; carpesterol and 3β-(p-hydroxy)benzoyloxy-22α-hydroxy-4α-methyl-5α-stigmast-7-en-6-one also isolated (*J. Nat. Prod.* 1993, *56,* 15).

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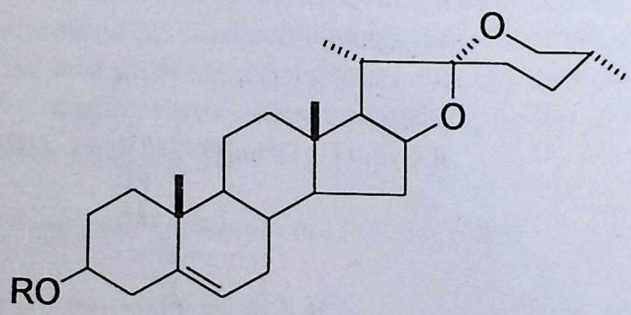

Indioside A

R = Glu[(2→1)Rha](3→1)Glu[(2→1)Rha](4→1)Glu

BIOLOGICAL ACTIVITY

Dioscin, protodioscin, methylprotoprosapogenin A of dioscin and methyl protodioscin exhibited cytotoxicity against colo-205, KB, HeLa, HA 22T, Hep-2, GBM 8401/TSGH; they also showed toxicity against cultured C6 glioma cells whereas methylprotoprosapogenin A of dioscin, methylprotodioscin and protodioscin also exhibited potent *in vivo* cytotoxicity against C6 glioma cells. Dioscin (10.0 μg/ml) inhibited DNA synthesis by C6 glioma cells (*Anticancer Res.* 1991, *11,* 1911; *Chem. Abstr.* 1992, *116,* 165861 h).

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S. khasianum Clarke; see *S. aculeatissimum* Jacq.

S. kurzii Brace ex Prain syn. *S. pubescens* Willd.var. *lobata* Clarke, *S. sanitwongsei* Craib
Garo - Khim-kha.
Diosgenin (0.2) and solasodine (0.8%) determined in oil from leaves (*Rev. Cubana Quim.* 1989, *5*, 65; *Chem. Abstr.* 1991, *115*, 155064 r).
Distribution: Sikkim, Bhutan, Arunachal Pradesh, Meghalaya, Mizoram. Manipur, Tripura and Nagaland.

S. lycopersicum L.; see *Lycopersicon lycopersicum* (L.) Karsten

S. lyratum Thunb.; see *S. dulcamara* L.

S. melongena L. var. *incanum* (L.) O. Ktze. syn. *S. incanum* L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 679).

A new solasodine glycoside - incanumine - isolated from fresh berries and characterised; in addition, khasianine, ursolic acid, its 3-O-palmitoyl, 3-O-crotonyl and 3-O-propionyl derivatives, solamargine, solasodine and stigmasterol-β-D-glucoside isolated (*J. Nat. Prod.* 1990, *53*, 513).

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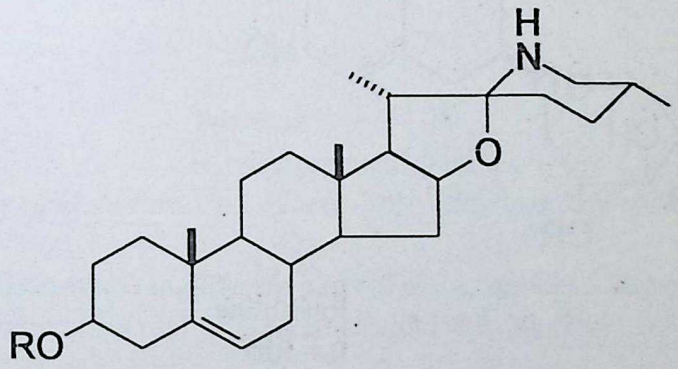

Incanumine
R = Glu[(3→1)Xyl](4→1)Rha(4→1)Xyl

BIOLOGICAL ACTIVITY

Solamargine, solasodine, ursolic acid, its 3-O-palmitoyl, 3-O-crotonyl and 3-O-propionyl derivatives exhibited significant cytotoxicity against human PLC/PRF/S cells *in vitro*. Esterification of ursolic acid with aliphatic acids enhanced cytotoxic effect against these cells (*J. Nat. Prod.* 1990, *53*, 513).

S. myriacanthum Dunal; see *S. aculeatissium* Jacq.

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S. nigrum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 681).

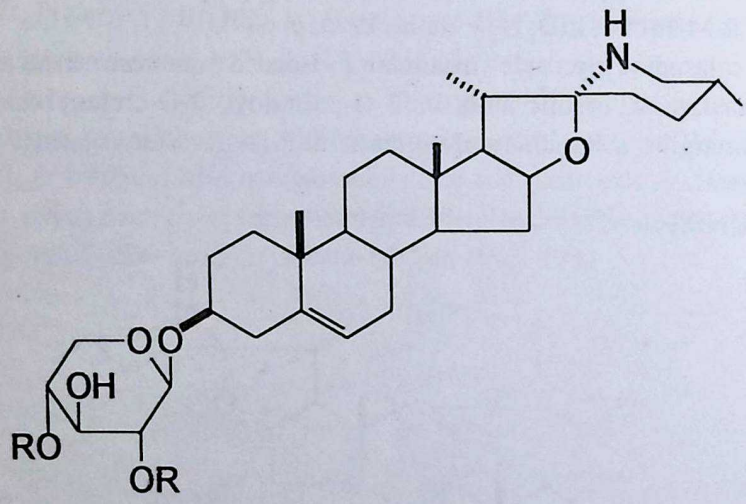
Isolation of α-solamargine and α-solasonine from green unripe fruits (*Pharmazie* 1989, *44,* 732; *Chem. Abstr.* 1990, *112,* 95551 y).

S. persicum Willd. ex R. & S.; see *S. dulcamara* L.

S. platanifolium Hook. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 633).

A new glycoalkaloid - ravifoline - isolated and its structure determined by ^{13}C-NMR; in addition, solasonine, solamargine, khasianine and solasodine isolated (*J. Nat. Prod.* 1994, *57,* 587).

NEW COMPOUNDS



Ravifoline
R = Rha

S. pubescens Willd. var. *lobata* Clarke; see *S. kurzii* Brace ex Prain

S. sanitwongsei Craib; see *S. kurzii* Brace ex Prain

S. spirale Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 683).

Partial synthesis of etioline (*Ann. Chem.* 1991, 143).

S. surattense Burm.f. syn. *S. xanthocarpum* Schard. & Wendl. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 597).

Isolation of solasodine (*Indian Drugs* 1990, *28,* 149); mixture of steroidal alkaloids

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(0.67%) obtained from berries; seeds contained fixed oil (9.76%) (*Sci. Int.* 1990, *2,* 137; *Chem. Abstr.* 1990, *113,* 227995 d).

S. torvum Swartz (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 683).

A new steroidal saponin - torvonin B - isolated from leaves and its structure determined (*Heterocycles* 1989, *29,* 1895); determination of solasodine obtained by hydrolysis of glycoalkaloids (*Phyton* 1989, *49,* 35; *Chem. Abstr.* 1991, *114,* 150278 h); chlorogenone (25(R)5α-spirostane-3,6-dione) and its 25(S)-epimer along with neochlorogenone isolated from fruits (*Phytochemistry* 1991, *30,* 1339).

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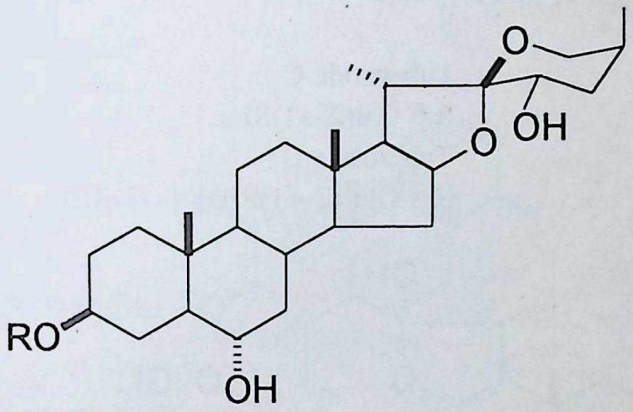

Torvonin B
R = Quinovose(2→1)Fuc

S. trilobatum L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 379).

Solasodine determined in different parts of plant; leaves contained highest and berries contained lowest amount of solasodine (*Indian Drugs* 1992, *29,* 509).

S. tuberosum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 683).

A new tuber-inducing stimulus (I) isolated from leaves and characterised as 3-oxo-2(5'-β-D-glucopyranosyloxy-2'(Z)-pentenyl)cyclopentane-1-acetic acid (*Agric. Biol. Chem.* 1989, *53,* 2835); ^{13}C-NMR studies of scopolin (*Magn. Reson. Chem.* 1989, *27,* 1097; *Chem. Abstr.* 1990, *113,* 78767 b); an anthocyanin - petanin - isolated from acidified methanolic extract of blue tubers and characterised as petunidin-3-O-[6-O-(4-O-(E)-p-coumaroyl-α-L-rhamnopyranosyl)-β-D-glucopyranosido]-5-O-β-D-glucopyranoside (*Phytochem. Anal.* 1991, *2,* 230; *Chem. Abstr.* 1992, *116,* 170125 a); seeds afforded two steroid glycosides - tuberosides C and D - whose structures determined (*Khim. Prir. Soedin.* 1991, 586; *Chem. Abstr.* 1993, *118,* 187779 f); another glycoside - tuberoside F - from seeds and its absolute configuration (*Khim. Prir. Soedin.* 1991,

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730; *Chem. Abstr.* 1992, *117*, 192171 k); a new sesquiterpene - tuberonone - isolated and its structure and absolute configuration determined (*Biosci., Biotechnol., Biochem.* 1992, *56*, 1890; *Chem. Abstr.* 1993, *118*, 230138 k).

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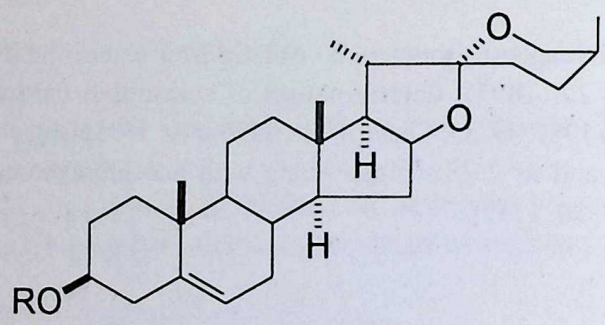
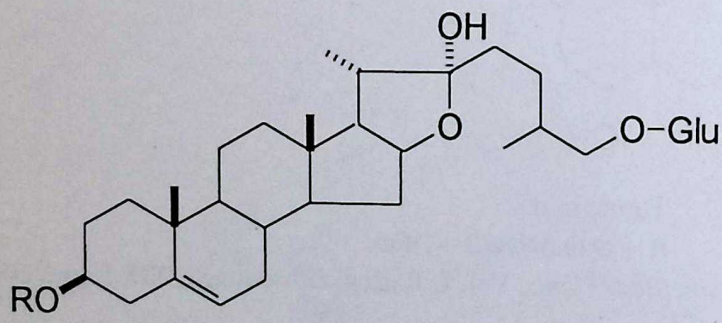
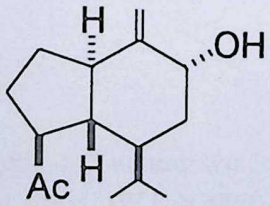


Tuberoside C
R = Gal(2→1)Rha
Tuberoside D
R = Glu[(2→1)Rha](4→1)Rha



Tuberoside F
R = Gal(2→1)Fuc



Tuberonone

BIOLOGICAL ACTIVITY

I exhibited tuber-inducing action at 0.01 mg/l (*Agric. Biol. Chem.* 1989, *53*, 2835).

S. xanthocarpum Schrad. & Wendl.; see *S. surattense* Burm.f.

SOLIDAGO (Asteraceae)

S. canadensis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 684).

Flowers contained quercetin, kaempferol, isorhamnetin and their 3-O-glycosides (*Sci. Pharm.* 1990, *58*, 15; *Chem. Abstr.* 1990, *113*, 46159 p); γ2- and δ-cadinenes identified in essential

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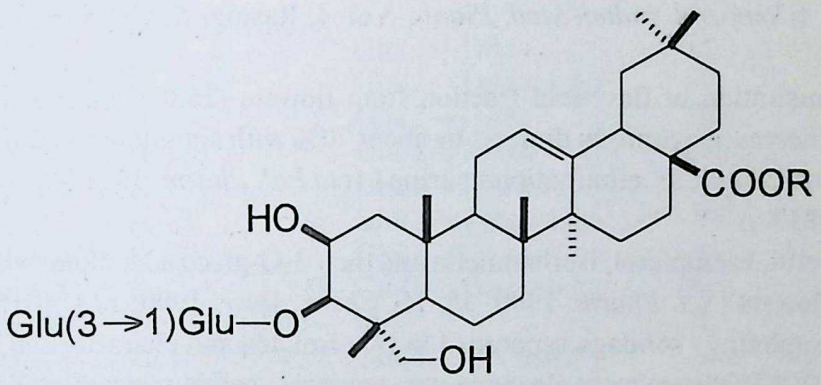
oil by GC and GC-MS (*Planta Med.* 1990, *56,* 222); four new saponins - canadensis saponins 1, 2, 3 and 4 - isolated and characterised (*Phytochemistry* 1991, *30,* 1629); more new saponins - canadensis saponins 5, 6, 7 and 8 - isolated and their structures established (*Planta Med.* 1992, *58,* 94); caffeic, ferulic and p-coumaric acids identified (*Pharmazie* 1992, *47,* 471; *Chem. Abstr.* 1992, *117,* 108230 y); crystal structure and conformation of solidagenone (*Acta Crystallogr., Cryst. Struct. Commun.* 1992, *48*C, 1337; *Chem. Abstr.* 1992, *117,* 131402 q); a new clerodane-type diterpenoid - 13(Z)7α-acetoxykolavenic acid - isolated from roots and its structure determined; in addition, kolavenic acid, kolavenol, 6β-angeloyloxy kolavenic acid, 6β-tigloyloxykolavenic acid, solidagolactone and 13(E)7α-acetoxykolavenic acid isolated; crystal structure of cis-8-dehydromatricaria ester determined (*Phytochemistry* 1993, *32,* 1483).

NEW COMPOUNDS



Canadensis saponin 1
R = Glu(6-deoxy)[(3→1)Apiose](2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Rha
Canadensis saponin 2
R = Ara[(3→1)Apiose](2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Rha
Canadensis saponin 3
R = Glu(6-deoxy)[(3→1)Rha](2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Rha
Canadensis saponin 4
R = Ara(3→1)Rha](2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Rha
Canadensis saponin 5
R = Glu(6-deoxy)[(3→1)Apiose](2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Rha(2→1)Gal
Canadensis saponin 6
R = Ara[(3→1)Apiose](2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Rha(2→1)Gal
Canadensis saponin 7
R = Glu(6-deoxy)[(3→1)Rha](2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Rha(2→1)Gal
Canadensis saponin 8
R = Ara[(3→1)Rha](2→1)Rha[(3→1)Xyl](4→1)Xyl(3→1)Rha(2→1)Gal

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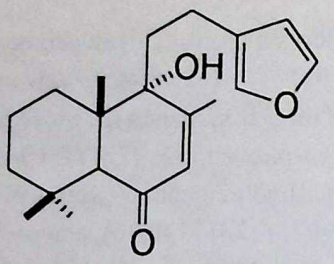
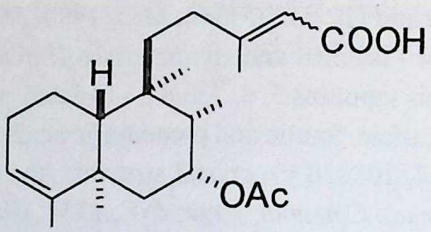
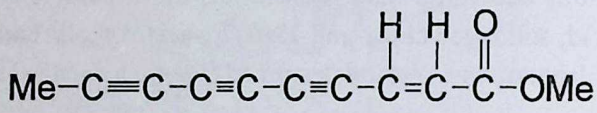


Solidagenone



13(Z),7α-Acetoxykolavenic acid



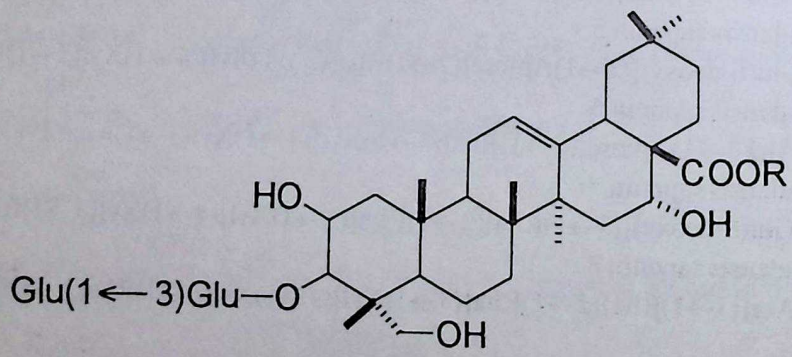
Cis-8-dehydromatricaria ester

S. virgaurea L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 684).

Administration of flavonoid fraction from flowers (25.0 mg/kg as a 1.0% aqueous solution, p.o.) increased overnight diuresis by about 70% with simultaneous drop in K^+ and Na^+ excretion and increased Ca^{2+} elimination in urine (*Acta Pol. Pharm.* 1991, *48,* 35; *Chem. Abstr.* 1993, *118,* 160813 a).

Quercetin, kaempferol, isorhamnetin and their 3-O-glycosides along with leiocarposide isolated from flowers (*Sci. Pharm.* 1990, *58,* 15; *Chem. Abstr.* 1990, *113,* 46159 p); nine new oleanane-type saponins - solidago saponins I to IX - isolated and characterised (*Chem. Pharm. Bull.* 1991, *39,* 2037); eleven more oleanane-type saponins - solidago saponins X to XX - isolated and their structures elucidated; virgaurea saponin 1 and bellissaponin BA2 also isolated (*Chem. Pharm. Bull.* 1992, *40,* 946); isolation of a new 3,28-bisdesmosidic triterpenoid glycoside - virgaurea saponin 3 - from mixture of deacylated saponins from aerial parts and its structure elucidation by 2D-NMR (*Phytochemistry* 1992, *31,* 621); caffeic, ferulic and p-coumaric acids isolated (*Pharmazie* 1992, *47,* 471; *Chem. Abstr.* 1992, *117,* 108230 y); plant further afforded nine new oleanane-type saponins - solidago saponins XXI to XXIX - whose structures established; in addition, virgaurea saponin 2 isolated (*Chem. Pharm. Bull.* 1994, *42,* 617).

NEW COMPOUNDS



Virgaurea saponin 3

R = Fucose(2→1)Rha(4→1)Xyl(3→1)Rha(2→1)Fucose

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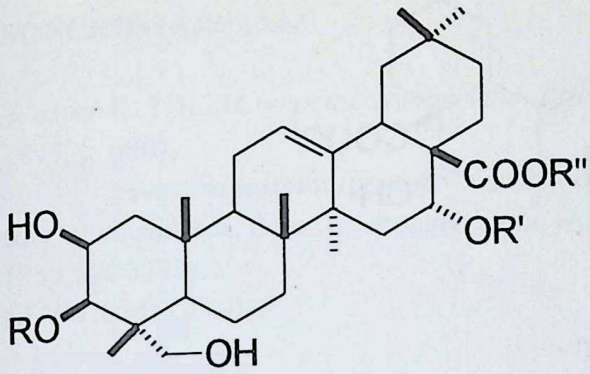
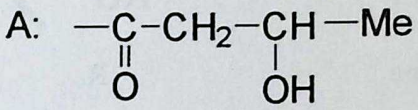
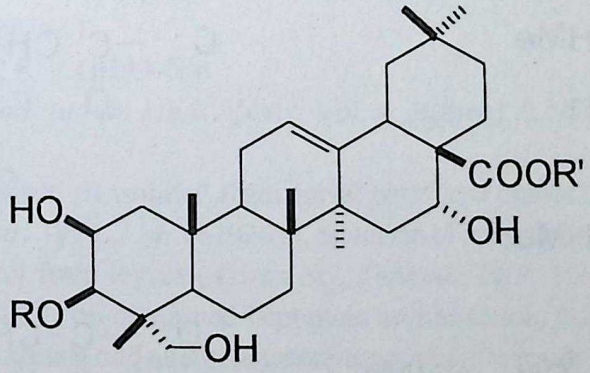




Name	R	R'	R"
Solidago saponin I	H	Glu(2→1)Ara	H
Solidago saponin II	H	Glu(2→1)Ara(4-A)	H
Solidago saponin III	H	Glu(2→1)Ara	Rha
Solidago saponin IV	H	Glu(2→1)Ara(4-A)	Rha
Solidago saponin V	H	Glu(2→1)Ara	Xyl
Solidago saponin VI	H	Glu(2→1)Ara(4-A)	Xyl
Solidago saponin VII	H	Glu(2→1)Ara	Ara
Solidago saponin VIII	H	Glu(2→1)Ara(4-A)	Ara
Solidago saponin IX	Glu(4→1)Glu	H	H
Solidago saponin X	Glu	Glu(2→1)Ara(4-A)	Ara(3,4-diAc)
Solidago saponin XI	Glu	Glu(2→1)Ara(4-A)	Ara(2,4-diAc)
Solidago saponin XII	Glu	Glu(2→1)Ara	Ara(3,4-diAc)
Solidago saponin XIII	Glu	Glu(2→1)Ara	Ara(2,4-diAc)



Name	R	R'
Solidago saponin XIV	Glu	Fuc(4-B)(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XV	Glu	Fuc(4-Ac)(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XVI	Glu	Fuc(4-A)(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XVII	Glu	Fuc[4-A(3-Ac)](2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XVIII	Glu	Fuc(4-C)(2→1)Rha(4→1)Xyl(3→1)Rha

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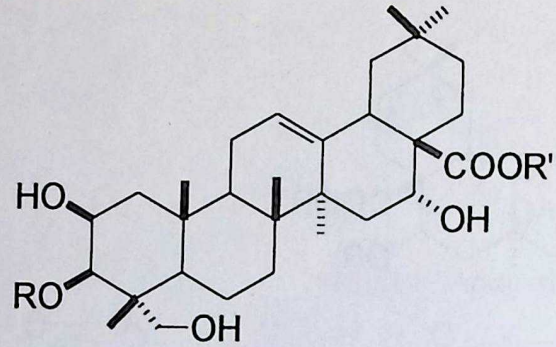
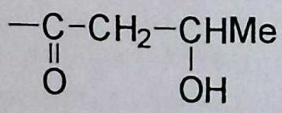
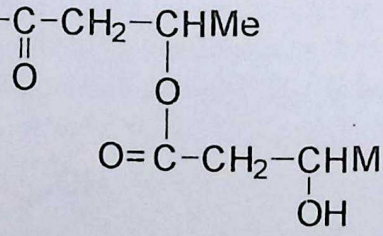
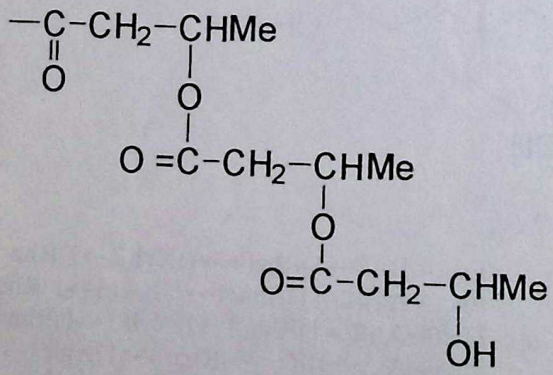
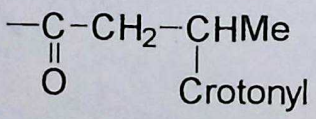


Name	R	R'
Solidago saponin XIX	Glu	Fuc(4-D)(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XX	Glu	Fuc(4-Ac)[(2→1)Rha(4→1)Xyl(3→1)Rha](3→1)Apiose(5-Ac)
Solidago saponin XXI	Glu(3→1)Xyl	Fuc(4-B)(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XXII	Glu(3→1)Xyl	Fuc(3-B)(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XXIII	Glu(3→1)Xyl	Fuc(4-B)[(3→1)Apiose(5-Ac)](2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XXIV	Glu(3→1)Xyl	Fuc(4-C)(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XXV	Glu(3→1)Xyl	Fuc(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XXVI	Glu(3→1)Glu	Fuc(4-B)(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XXVII	Glu(4→1)Glu	Fuc(2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XXVIII	Glu(3→1)Glu	Fuc(4-Ac)[(3→1)Apiose](2→1)Rha(4→1)Xyl(3→1)Rha
Solidago saponin XXIX	Glu(4→1)Glu	Fuc(4-Ac)[(3→1)Apiose](2→1)Rha(4→1)Xyl(3→1)Rha

A : 

C : 

B : 

D : 

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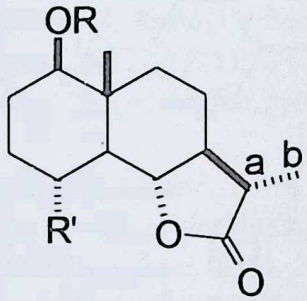
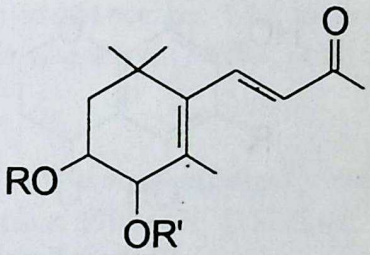
SONCHUS (Asteraceae)

S. asper (L.) Hill (*Compend. Indian Med. Plant,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 600).

Five new sesquiterpene glycosides - sonchusides E, F, G, H and I - and three ionones - sonchuionosides A, B and C - isolated along with sonchuside D and icariside B1 (*Phytochemistry* 1989, *28,* 3399).

NEW COMPOUNDS





Sonchuside E
R = Glu, R' = CHO, ab = Δ
Sonchuside F
R = Glu, R' = CH_2OH, ab = Δ
Sonchuside G
R = Glu, R' = CHO
Sonchuside H
R = Glu, R' = CH_2OH,
Sonchuside I
R = H, R' = CH_2O-Glu

Sonchuionoside A
R = H, R' = Glu
Sonchuionoside B
R = H, R' = Apioglucoside
Sonchuionoside C
R = Glu, R' = H

S. oleraceus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 685).

A new disaccharide (I) isolated from aerial parts and characterised (*Orient. J. Chem.* 1990, *6,* 205; *Chem. Abstr.* 1991, *114,* 182026 r); isolation of scopoletin, esculetin, ceryl alcohol, α-amyrin and β-sitosterol from leaves (*Aswan Sci. Technol. Bull.* 1992, *13,* 15; *Chem. Abstr.* 1993, *119,* 68059 g); volatile oil contained heptanoic and hexanoic acids, γ-terpineol, geraniol, geranial, butanol, bornyl acetate and anethole whereas nonvolatile residue contained 3β,25-epoxy-3-hydroxyolean-18-en-28-oic acid (*Egypt. J. Pharm. Sci.* 1992, *33,* 689; *Chem. Abstr.* 1994, *120,* 294125 c).

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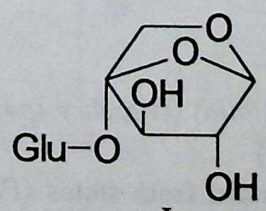

I

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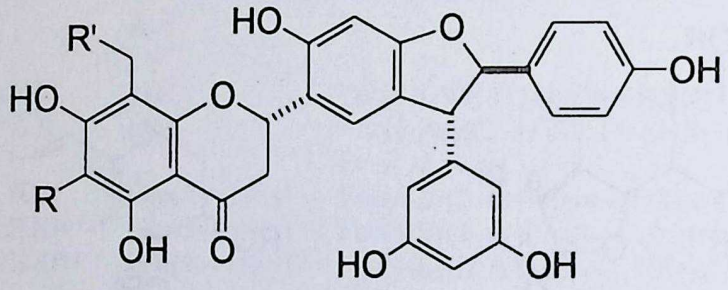
SOPHORA (Papilionaceae)

S. moorcroftiana (Benth.) Benth. ex Baker (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 686).

Three new prenylflavanones - sophora flavanones H, I and J - isolated from roots and characterised; in addition, licoisoflavone A, euchrestaflavanone A and phaseollidin isolated (*Chem. Pharm. Bull.* 1991, *39,* 1568).

NEW COMPOUNDS



Sophora flavanone H
R = H, R' = CH=CMe$_2$
Sophora flavanone I
R = H, R' = CH(CMe=CH$_2$)CH$_2$CH=CMe$_2$
Sophora flavanone J
R,R' = CH=CMe$_2$, R' = CH=CMe$_2$

S. secundiflora Lag. ex DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 687).

Cytisine, its N-methyl and N-formylderivatives, epilupinine isolated from, seeds (*Bull. Fac. Sci., Assiut Univ.* 1989, *18,* 63; *Chem. Abstr.* 1991, *114,* 139724 e).

BIOLOGICAL ACTIVITY

Administration of seed extract, i.p., to streptozotocin-induced diabetic mice caused marked hypoglycaemia (*Bull. Fac. Pharm.* Cairo Univ. 1993, 107; *Chem. Abstr.* 1994, *120,* 261005 k).

S. tomentosa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 687).

Isolation of sophoracarpans A and B, wighteone (erythrinin B), sophoraisoflavanone A and (-)maackiain (*Chem. Pharm. Bull.* 1990, *38,* 2756).

SOPUBIA (Scrophulariaceae)

S. delphiniifolia (L.) G.Don (*delphinifolia*) (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 231).

Isolation of 6-prenylisocaviunin from stems (*Phytochemistry* 1990, *29,* 3921); a

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phytoestrogen (I) isolated from stems and characterised as 3'-prenyl-4'-methoxyisoflavone-7-O-β-D-(2"-O-p-coumaroyl)glucoside (*J. Nat. Prod.* 1990, *53*, 62).

BIOLOGICAL ACTIVITY

6-Prenylisocaviunin and phytoestrogen (I) exhibited estrogenic activity in rats (*J. Nat. Prod.* 1990, *53*, 62; *Phytochemistry* 1990, *29*, 3921).

SORGHUM (Poaceae)

S. bicolor (L.) Moench syn. *S. vulgare* (L.) Pers., *Andropogon sorghum* Brot. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 688).

5-Methoxy-3-(8'Z,11'Z)-pentadeca-8',11',14-trienyl-benzene-1,2,4-triol which stimulates germination of *Striga asiatica*, synthesised (*J. Chem. Soc.* Perkin I 1990, 1429).

S. caudatum (Hack.) Stapf

Apigeninidin chloride isolated from leaf sheaths is a potent fungal growth inhibitor and useful dye (*J. Chem. Ecol.* 1994, *20*, 2123; *Chem. Abstr.* 1994, *121*, 175228 z).

Distribution: Cultivated in Maharashtra.

S. dochna (Forsk.) Snowden

Fatty acid and lipid composition of seed oil determined (*Indian J. Pharm. Sci.* 1993, *55*, 45).

Distribution: Cultivated in various parts of India, in plains.

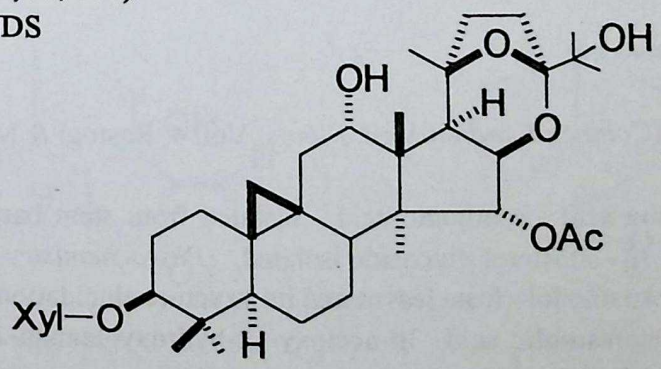
S. vulgare (L.) Pers.; see *S. bicolor* (L.) Moench

SOULIEA (Ranunculaceae)

S. vaginata (Maxim.) Franch. syn. *Coptis ospricarpa* Bruhl (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 688).

A new triterpene xyloside - beesioside IV - isolated from rhizomes and characterised (*Heterocycles* 1990, *30*, 897).

NEW COMPOUNDS



Beesioside IV

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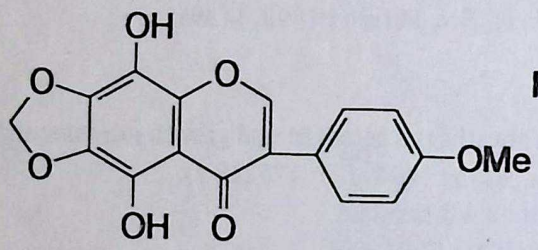
SPARTIUM (Papilionaceae)

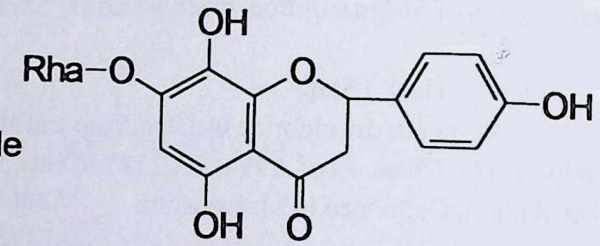
S. junceum L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 603).

Two new flavonoids isolated and characterised as 5,8-dihydroxy-4'-methoxy-6,7-methylenedioxyisoflavone (I) and carthamidin-7-O-α-L-rhamnoside; a new triterpenoid saponin - junceoside - and its aglycose, junceogenol, also isolated and their structures elucidated; in addition, apigenin-7-O-β-D-glucoside and genistein-8C-β-D-glucoside also isolated (*Phytochemistry* 1993, *34,* 847).

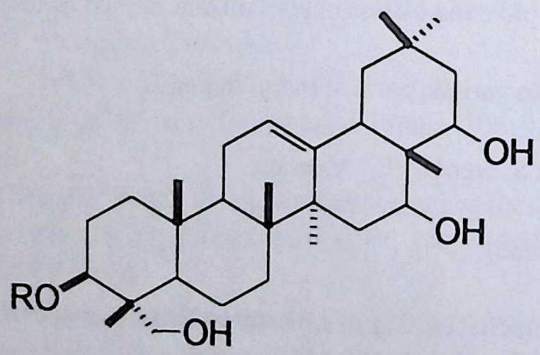
NEW COMPOUNDS



I



Carthamidin-7-O-rhamnoside



Junceoside
R = Rha(2→1)Glu

SPATHODEA (Bignoniaceae)

S. campanulata Beauv. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi. 1995, p. 689).

A new triterpene acid - spathodic acid - isolated from stem bark and its structure determined; in addition, β–sitosterol glucoside isolated (*Phytochemistry* 1990, *29,* 3959); a new polyhydroxysterol - spathodol - from leaves and its structure elucidation; oleanolic acid, its 3β-acetoxy derivative, siaresinolic acid, 3β-acetoxy-12-hydroxyoleanan-28,13-olide and β-sitosterol glucoside also isolated (*J. Nat. Prod.* 1991, *54,* 873).

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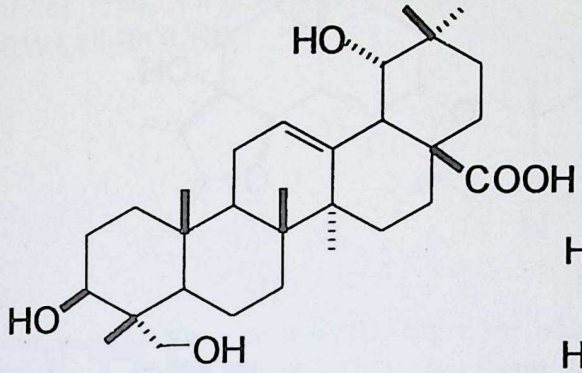
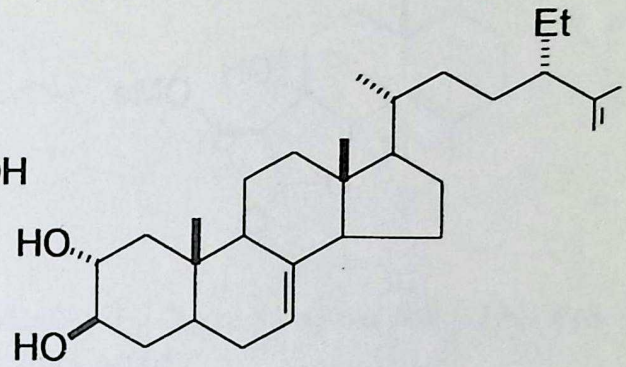
NEW COMPOUNDS



Spathodic acid



Spathodol

SPERMACOCE (Rubiaceae)

S. hispida L.; see *Borreria articularis* (L.f.) F.N. Will.

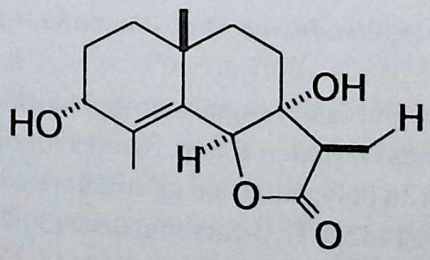
S. ocymoides Burm.f.; see *Borreria ocymoides* (Burm.f.) DC.

SPHAERANTHUS (Asteraceae)

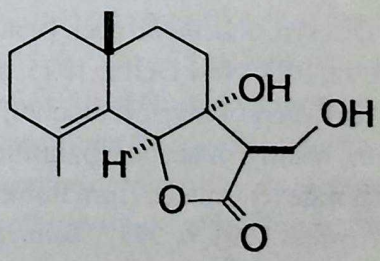
S. indicus L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 690).

Isolation of three new eudesmanolides (I, II and III) from flowers and their characterisation as 11α,13-dihydro-3α,7α-dihydroxyfrullanolide, 11α,13-dihydro-7α,13-dihydroxyfrullanolide and 11α,13-dihydro-7α-hydroxy-13-methoxyfrullanolide respectively (*J. Nat. Prod.* 1991, *54,* 882); two more eudesmanolides (IV and V) isolated and their structures established; cryptomeridiol and 4-epicryptomeridiol also isolated (*Phytochemistry* 1992, *31,* 3270); flowers afforded two cyclopeptide alkaloids (VI and VII) whose tentative structures proposed (*Sci. Int.* (Lahore) 1992, *4,* 151; *Chem. Abstr.* 1993, *118,* 230141 f).

NEW COMPOUNDS



I



II

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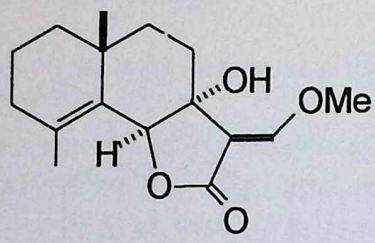

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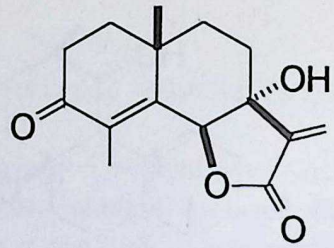

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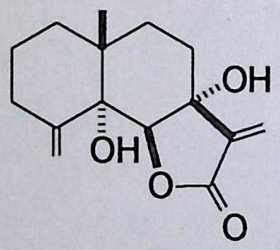

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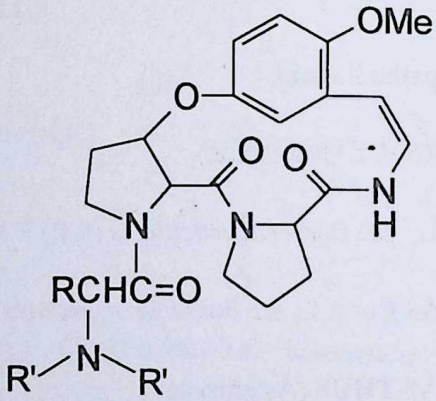

VI
R = CH_2Ph, R' = Me
VII
R = Me, R' = H

SPILANTHES (Asteraceae)

S. acmella (L.) Murr.; see *S. calva* DC.

S. acmella (L.) Murr. var. *oleracea* (L.) Clarke; see *S. oleracea* L.

S. calva DC. syn. *S. acmella* auct. [non (L.) Murr.] (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 691).

Isolation of myricyl alcohol, β-sitosterol, its glucoside, stigmasterol glucoside, α- and β-amyrins, α-amyrin acetate, palmitic and stearic acids (*J. Indian Chem. Soc.* 1990, *67,* 784); a eudesmanolide (I) isolated from flower heads along with polygodial and its structure determined (*Chem. Express* 1991, *6,* 993; *Chem. Abstr.* 1992, *116,* 148220 f); β-caryophyllene (30.2), thymol (18.3) and γ-cadinene (13.3%) determined in essential oil from Brazilian plants (*J. Essent. Oil Res.* 1991, *3,* 369; *Chem. Abstr.* 1992, *116,* 27781 f); limonene (23.6), β-caryophyllene (20.9),

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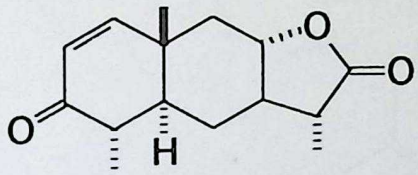
(Z)β-ocimene (14.0), germacrene D (10.8) and myrcene (9.5%) present in flower heads (*J. Essent. Oil Res.* 1993, *5*, 693; *Chem. Abstr.* 1994, *121*, 78297 p).

NEW COMPOUNDS



I

S. oleracea L. syn. *S. acmella* (L.) Murr. var. *oleracea* (L.) Clarke (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 605).

Two new pungent alkamides isolated from flower heads and characterised as 2(E)N-(2-methylbutyl)-2-undecene-8,10-diynamide and (2E,7Z)-N-isobutyl-2,7-tridecadien-10,12-diynamide; in addition, 7(Z)N-isobutyl-7-tridecene-10,12-diynamide and spilanthol isolated (*Biosci., Biotechnol., Biochem.* 1992, *56*, 759; *Chem. Abstr.* 1992, *117*, 66628 b); another alkamide from flower heads and its characterisation as N-phenethyl-3-hydroperoxy-2-hydroxy-6,8-nonadiynamide (*Chem. Express* 1992, *7*, 153; *Chem. Abstr.* 1992, *116*, 172615 j).

SPINACIA (Chenopodiaceae)

S. oleracea L. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 691).

Aerial parts afforded rutin, hyperoside, astragalin and caffeic, chlorogenic, neochlorogenic and protocatechuic acids (*Khim. Prir. Soedin.* 1991, 719; *Chem. Abstr.* 1992, *117*, 118300 k).

SPIRANTHES (Orchidaceae)

S. australis (R.Br.) Lindl.; see *S. sinensis* (Pers.) Ames

S. sinensis (Pers.) Ames syn. *S. australis* (R.Br.) Lindl., *S. sinensis* (Pers.) Ames var. *amoena* (M. Bieb.) Hara

A dimeric dihydrophenanthrene - spiranthesol - isolated from roots and its structure elucidated (*Chem. Pharm. Bull.* 1989, *37*, 1667; *ibid.* 1990, *38*, 629); three new dihydrophenanthrenes - spiranthols A and B and spirasineol A - isolated and their structures determined; in addition, orchinol, p-hydroxybenzaldehyde and p-hydroxybenzyl alcohol isolated (*Chem. Pharm. Bull.* 1989, *37*, 3195); three more dihydrophenanthrene derivatives - spiranthoquinone, spiranthol C and spirasineol B - from roots and their characterisation (*Chem. Pharm. Bull.* 1990, *38*, 629).

Distribution: Throughout India, ascending to 4600 m in Himalayas and other mountains.

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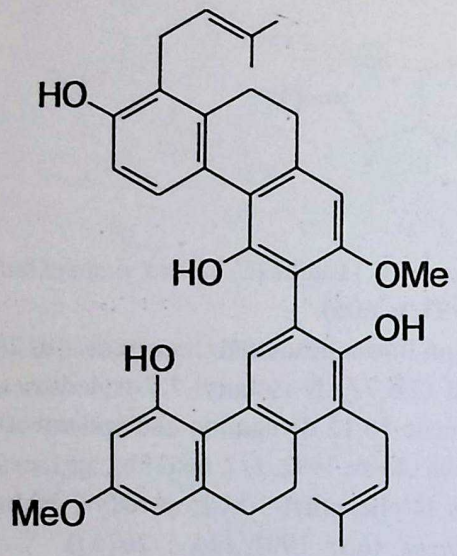
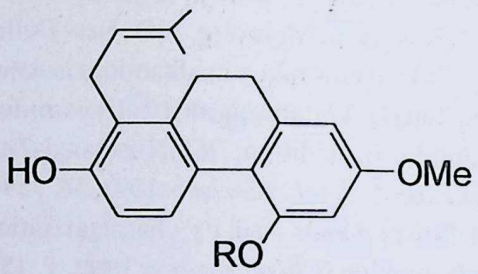
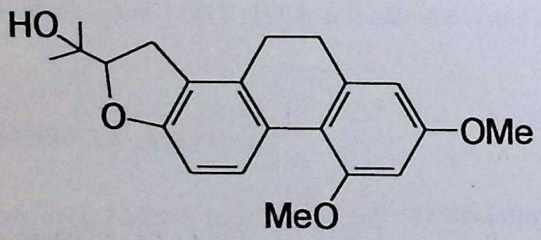
NEW COMPOUNDS



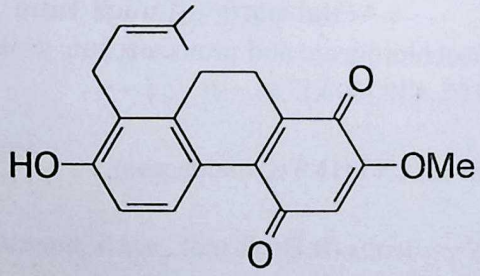
Spiranthesol



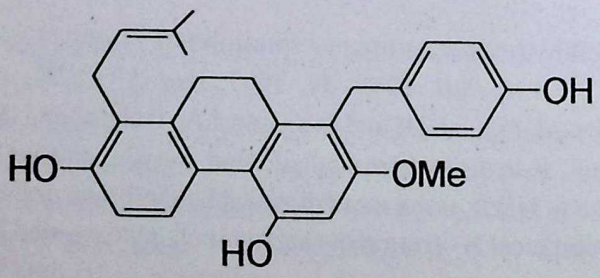
Spiranthol A
R = H
Spiranthol B
R = Me



Spiranthol C



Spiranthoquinone



Spirasineol A

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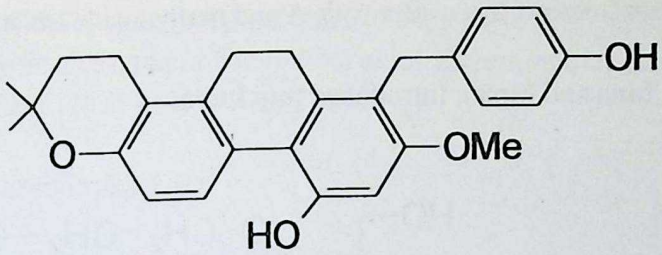

Spirasineol B

S. sinensis (Pers.) Ames var. *amoena* (M.Bieb.) Hara; see *S. sinensis* (Pers.) Ames

SPONDIAS (Anacardiaceae)

S. axillaris Roxb.; see *Choerospondias axillaris* (Roxb.) Burtt & Hill

S. lutea L.; see *S. mombin* L.

S. mombin L. syn. *S. lutea* L.

Eng. - Yellow Spanish plum, Yellow mombin.

Two ellagitannins - geraniin and galloylgeraniin - isolated from leaves (*Phytochemistry* 1991, *30,* 1129); 2-O-caffeoyl-(+)allohydroxycitric acid ester and chlorogenic acid butyl ester isolated from leaves and stems (*Phytochemistry* 1992, *31,* 1979); butanol, butanoic acid, ethyl 3-hydroxybutanoate, ethyl 3-hydroxyhexanoate, butyl butanoate and butyl 3-hydroxybutanoate identified in fruit volatiles by GC-MS (*Flavour Fragrance J.* 1992, *7,* 337; *Chem. Abstr.* 1993, *119,* 47977 q); ethyl acetate (14.4), ethyl butyrate (14.4), ethyl hexanoate (8.8), hexyl butyrate (7.9%) and linalool determined in fruit volatile fraction by GC-MS (*J. Essent. Oil Res.* 1992, *4,* 535; *Chem. Abstr.* 1993, *118,* 167913 s).

Distribution: Native of tropical America, introduced into India.

BIOLOGICAL ACTIVITY

2-O-Caffeoyl-(+)allohydroxycitric acid ester and chlorogenic acid butyl ester showed antiviral activities against *Cox sackie* and Herpes simplex viruses respectively (*Phytochemistry* 1992, *31,* 1979).

STACHYS (Lamiaceae)

S. sieboldii Miq.

Eng. - Chinese artichoke, Japanese potato.

A new iridoid glycoside - stachysoside A - and two phenylethanoid glycosides - stachysosides B and C - isolated from tuber and characterised (*Yakugaku Zasshi* 1990, *110,* 652; *Chem. Abstr.* 1991, *114,* 78651 e); more phenethyl alcohol glycosides - stachysosides A*, B*, C* - isolated and their structures established; in addition, acteoside, its cis-isomer,

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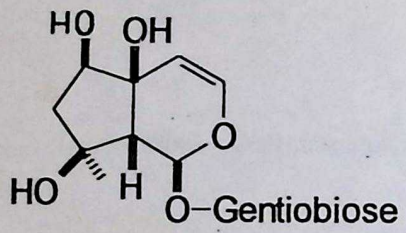
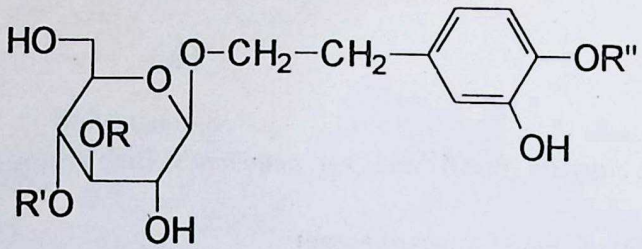
decaffeoylacteoside and isoacteoside, leucosceptoside A and martynoside isolated (*Phytochemistry* 1991, *30,* 965).

Distribution: Native of China and Japan, introduced into India.

NEW COMPOUNDS



Stachysoside A



Stachysoside B (A*)
R = Rha(2→1)Ara, R' = Caffeoyl, R" = H
Stachysoside C (B*)
R = Rha(2→1)Ara, R' = Feruloyl, R" = H
Stachysoside C*
R = Rha(2→1)Ara, R' = Feruloyl, R" = Me

BIOLOGICAL ACTIVITY

Effects of acteoside (ACT) on crescentic-type anti-GBM nephritis in rats investigated. In ACT-treated rats elevation of protein excretion into urine was inhibited and cholesterol and creatinine contents and antibody production against rabbit r-globulin in plasma were lower than those in control nephritic group. Results suggest that ACT may be a useful medicine against rapidly progressive glomerulonephritis which is characterised by severe glomerular lesions with diffuse crescents (*Jap. J. Pharmacol.* 1994, *65,* 143); acteoside (30.0 mg/kg, p.o.) given to rats once a day for 15 consecutive days after treatment with anti-glomerular basement membrane serum markedly suppressed urinary protein as well as glomerular histological changes and accumulation of total leukocytes in glomeruli. It is likely that acetoside exerts its antinephritic action by suppressing accumulation of leukocytes in glomeruli (*Jap. J. Pharmacol.* 1994, *66,* 47).

Note : Same trivial names (Stachysosides A, B and C) have been assigned to three compounds isolated by two groups of workers, as mentioned above. To differentiate, one set of compounds have been designated by astericks eg. A*, B* and C*. Legends of chemical structures carry the relative identity between the two sets of stachysosides; B is identical to A* and C is identical to B*. In the post-script of paper, *Phytochemistry* 1991, *30,* 965, names of compounds designated as stachysosides A*, B* and C* have been changed by authors to lavandulifolioside, stachysosides C and D respectively.

STACHYTARPHETA (Verbenaceae)

S. mutabilis Vahl (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 606).

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Linoleic (73.7), oleic (9.1), palmitic (7.7), stearic (5.4), arachidic (1.1), behenic (1.0), myristic (1.0), capric (0.5) and lauric (0.5%) acids determined in seed oil (*Fett. Wiss. Technol.* 1990, *92,* 131; *Chem. Abstr.* 1990, *112,* 232551 q).

STELLARIA (Caryophyllaceae)

S. media Hook.f.; see *S. media* (L.) Vill. var. *media*

S. media (L.) Vill. var. *media* syn. *S. media* sensu Hook.f. p.p. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 233).

Flowering plant contained saponins (4.5%) gypsogenin identified as major sapogenin (*Farmacia* 1989, *37,* 105; *Chem. Abstr.* 1990, *112,* 115812 q); isovitexin-7,2"-di-O-glucoside, isovitexin -7-O-galactosyl-2"-O-glucoside, C-glycosides of orientin, isoorientin, vitexin, isovitexin and two different 6,8-di-C-hexosylapigenins and two different 6C-hexosyl-8C-pentosylapigenins isolated (*Planta Med.* 1991, *57,* 290; *Pol. J. Pharmacol. Pharm.* 1991, *43,* 395; *Chem. Abstr.* 1992, *117,* 288 j); isolation of luteolin, apigenin genistein, vicenin 2 and p-hydroxybenzoic, ferulic, caffeic, vanillic, chlorogenic acids and an unidentified hydroxybenzoic acid (*Pharmazie* 1992, *47,* 470; *Chem. Abstr.* 1992, *117,* 108229 e).

BIOLOGICAL ACTIVITY

C-Glycosides of orientin and isoorientin exhibited antioxidant activity (*Pol. J. Pharmacol. Pharm.* 1991, *43,* 395; *Chem. Abstr.* 1992, *117,* 288 j).

STELLERA (Thymelaeaceae)

S. chamaejasme L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 693).

Methanolic extract of roots exhibited anti-tumor activity against murine P-388 leukaemia *in vivo*.

Pimelea factor P2 isolated as active constituent from roots (*Wakan lyaku Gakkaishi* 1991, *8,* 96; *Chem. Abstr.* 1992, *116,* 207421 x).

STEMONA (Stemonaceae)

S. tuberosa Lour. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 607).

Total synthesis of stenine (*J. Org. Chem.* 1990, *55,* 6236); isolation of new alkaloid - tuberostemonone - from roots and its crystal structure determination (*J. Crystallogr. Spectroscop. Res.* 1991, *21,* 189; *Chem. Abstr.* 1991, *115,* 46042 m; *J. Nat. Prod.* 1992, *55,* 571); another alkaloid - stemonine LG - from roots and its characterisation (*Tap Chi Duoc Hoc* 1991, 4; *Chem. Abstr.* 1992, *117,* 108076 c); roots from Chinese plant afforded more new alkaloids -

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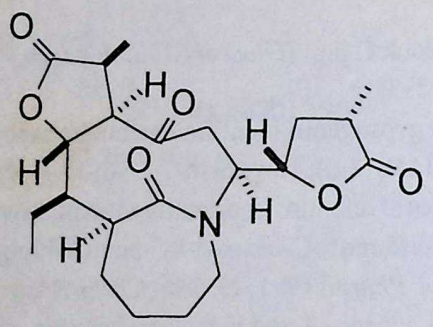
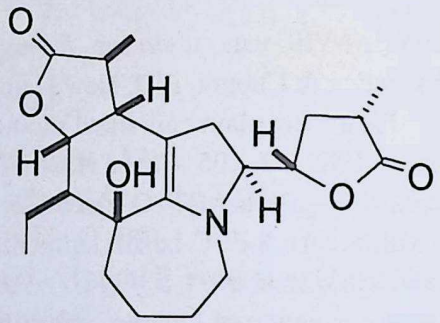
tuberostemonol, stemoamide and tuberostemospironine - whose structures elucidated; in addition, tuberostemonine and didehydrotuberostemonine obtained (*J. Nat. Prod.* 1992, *55*, 571); two new alkaloids - stemoninoamide and tuberostemoninol - from roots and their characterisation (*Chinese Chem. Lett.* 1993, *4*, 1067; *Chem. Abstr.* 1994, *121*, 53895 u; *Phytochemistry* 1994, *36*, 1333); tuberostemoamide isolated (*Chinese Chem. Lett.* 1993, *4*, 1067; *Chem. Abstr.* 1994, *121*, 53895 u); enantiocontrolled total synthesis of stemoamide (*Tetrahedron Lett.* 1994, *35*, 6417).

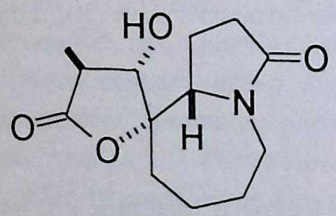
NEW COMPOUNDS



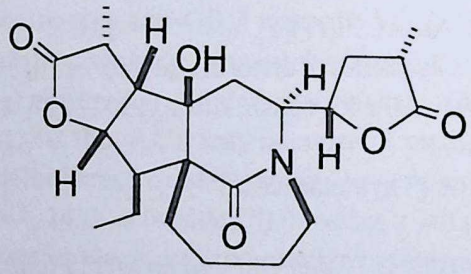
Tuberostemonone



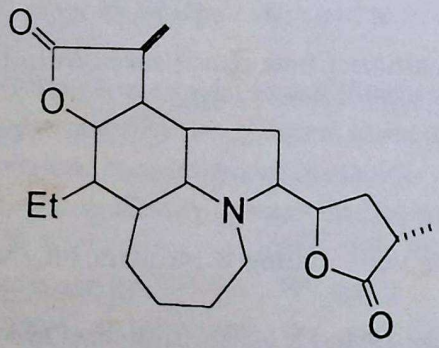
Tuberostemonol



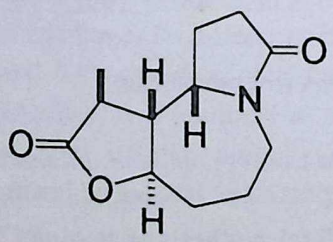
Tuberostemospironine



Tuberostemoninol



Stemonine LG



Stemoamide

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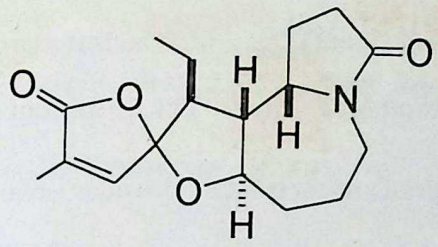

Stemoninoamide

STENOLOBIUM (Bignoniaceae)

S. stans (L.) D.Don; see *Tecoma stans* (L.) Juss. ex H.B & K.

STEPHANIA (Menispermaceae)

S. glabra (Roxb.) Miers syn. *S. rotunda* sensu Hook.f. & Thoms. p.p. (non Lour.) (*Compned. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 694).

Total alkaloid fraction (1.0 to 10.0 μg/ml) decreased amplitude and frequency of natural contraction of intestine and uterus. It antagonized contractions of smooth muscle of intestine and uterus induced by acetylcholine, serotonin , histamine and barium chloride (*Tap. Chi Duoc Hoc* 1993, 23; *Chem. Abstr.* 1993, *119,* 217131 d).

S. rotunda Lour.; see *S. glabra* (Roxb.) Miers

STEPHEGYNE (Rubiaceae)

S. parvifolia (Roxb.) Korth.; see *Mitragyna parvifolia* (Roxb.) Korth.

STERCULIA (Sterculiaceae)

S. foetida L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 695).

Leucoanthocyanidin-3-O-α-L-rhamnopyranoside and quercetin rhamnoside isolated from roots (*J. Indian Chem. Soc.* 1991, *68,* 426).

S. urens Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 696).

Leaves afforded two new flavonol glycosides characterised as quercetin-3-O-(6"-O-α-L-rhamnopyranosyl)-β-D-glucoside and kaempferol-3-O-(6"-O-α-L-rhamnopyranosyl)-β-D-glucoside; in addition, β-amyrin, its 3-acetyl derivative, β-sitosterol and an ester of terephthalic

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acid isolated (*J. Indian Chem. Soc.* 1989, *66,* 287); 7-hydroxy-6-methoxycoumarin isolated from roots (*J. Indian Chem. Soc.* 1991, *68,* 426).

S. villosa Roxb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 610).

Diosmetin and chrysoeriol and their 7-O-glucosides isolated (*Fitoterapia* 1990, *61,* 373).

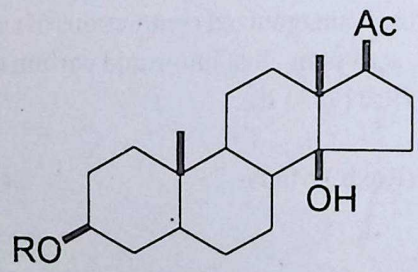
STREBLUS (Moraceae)

S. asper Lour. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 696).

Crude extract of stem bark exhibited significant macrofilaricidal activity against *Litomosoides carinii* and *Brugia malayi* in cotton rat and *Mastomys natalensis* (*Drug Dev. Res.* 1992, *26,* 67; *Chem. Abstr.* 1992, *117,* 82939 j).

Identification of n-triacontane, tetracontan-3-one, β-sitosterol, stigmasterol, betulin and oleanolic acid in aerial parts (*Fitoterapia* 1990, *61,* 186); a pregnane glycoside - sioraside - isolated and its structure established (*Phytochemistry* 1992, *31,* 1056).

NEW COMPOUNDS



Sioraside
R = Glu(3-Me)

BIOLOGICAL ACTIVITY

Asperoside and strebloside exhibited antifilarial activity, former being more effective; it was active at 50.0 mg/kg orally, against *L. carinii* (>90%) in cotton rat and against *B. malayi* (>70%) and *Acanthocheilonema viteae* (>70%) in *M. natalensis.* A glycones of these glycosides showed weak activity (*Drug Dev. Res.* 1992, *26,* 67; *Chem. Abstr.* 1992, *117,* 82939 j).

STRIGA (Scrophulariaceae)

S. asiatica (L.) Kuntze var. *asiatica* syn. *S. lutea* sensu Hook.f., p.p. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 697).

Petroleum ether and chloroform extracts of plant exhibited significantly antifertility activity in mice and complete and partial resorption of implants at a dose of 100 mg/kg and 50 mg/kg respectively (*Indian J. Physiol. Pharmacol.* 1990, *34,* 23).

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7,4'-Dimethylscutellarein isolated from aerial parts along with apigenin, luteolin and β-sitosterol (*Indian J. Heterocycl. Chem.* 1992, *1*, 259; *Chem. Abstr.* 1992, *117*, 167677 x).

S. lutea Hook.f.; see *S. asiatica* (L.) Kuntze var. *asiatica*

STROBILANTHES (Acanthaceae)

S. callosus Nees; see *Carvia callosa* (Nees) Bremek.

S. cusia (Nees) Imlay syn. *S. flaccidifolius* Nees (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 698).

Lupeol, betulin, lupenone, indigo, indirubin, 4(3H)-quinazolinone and 2,4(1H,3H)-quinazolinedione isolated (*Yaoxue Xuebao* 1993, *28*, 238; *Chem. Abstr.* 1993, *119*, 24635 n).

BIOLOGICAL ACTIVITY

Indirubin reported to inhibit growth of leukaemia cells and 4(3H)-quinazolinone exhibited hypotensive activity (*Yaoxue Xuebao* 1993, *28*, 238; *Chem. Abstr.* 1993, *119*, 24635 n).

S. flaccidifolius Nees; see *S. cusia* (Nees) Imlay

STROPHANTHUS (Apocynaceae)

S. gratus Franch. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 698).

BIOLOGICAL ACTIVITY

Effect of ouabain on smooth muscles of airway investigated in anaesthetised, paralysed and artificially ventilated mongrel dogs. Ouabain (30.0 μg/kg, i.v.) caused constriction of tracheal smooth muscle which was followed by bradycardia and the constriction was inhibited by bilateral vagotomy; mechanism of this constriction suggested (*Jap. J. Pharmacol.* 1990, *53*, 293); effect of ouabain on cholinergic neurotransmission of trachea was investigated using isolated tracheal strips in dogs. Ouabain (0.3 to 30.0 μM) caused concentration-dependent, slow sustained tracheal contraction which was inhibited by atropine but enhanced by physostigmine. These results suggest that ouabain-induced tracheal contraction may be mainly due to acceleration of presynaptic Ach release by enhancing influx of Ca^{2+} (*Jap. J. Pharmacol.* 1990, *53*, 301); facilitation of contractile response to serotonin in isolated rabbit ear artery preparation by ouabain was several fold that of norepinephrine (*J. Pharmacol. Exp. Ther.* 1990, *253*, 668); ouabain showed inotropic effect in hypertrophied rat heart using isolated langendorff heart preparation (*Pfluegers Arch.* 1990, *417*, 247; *Chem. Abstr.* 1991, *114*, 94861 d); influence of ouabain on water and electrolyte transport in rabbit distal ileum and proximal colon was studied. *In vitro*, ouabain markedly reduced absorption of water, Na^+, Cl^- and HCO_3- and reduced K^+ secretion in both ileum and colon. *In vivo* results were similar but less marked (*Nahrung* 1991, *35*, 577; *Chem. Abstr.* 1992, *116*,

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51261 g); effects of ouabain on muscle tension and intracellular Ca^{2+} level ($[Ca^{2+}]i$) were examined in guinea pig aorta loaded with fura-2. It caused gradual and sustained increase in both $[Ca^{2+}]i$ and muscle tension which was inhibited by Ni^{2+}. Results suggest that ouabain induced contraction by increasing Ca^{2+} influx through Na^+/Ca^{2+} exchanger on plasma membrane but not through verapamil-sensitive Ca^{2+} channels (*Eur. J. Pharmacol.* 1992, *224,* 71); inhibition of Na^+, K^+-ATPase activity in isolated rat aorta was dependent on concentration of ouabain and inversely proportional to concentration of K^+ in reaction mixture. Norepinephrine-induced contraction of isolated rat aorta was augmented by ouabain and low K^+. These finding suggest that inhibition of Na^+, K^+-ATPase activity may be correlated with augmentation of vascular contractility which may be due to activation of Na^+ -Ca^{2+} exchange system (*Gen. Pharmacol.* 1992, *23,* 279; *Chem. Abstr.* 1992, *116,* 187793 q); cardiovascular system of rats was more sensitive to action of ouabain 48 hr after coronary artery embolisation with 15 μ microspheres (*Eksp. Klin. Farmakol.* 1992, *55,* 29; *Chem. Abstr.* 1993, *118,* 116463 n).

Ouabain infusion (1.0 mg/h) to conscious Na-replete sheep with chronically indwelling catheter in renal artery increased sodium excretion from 124 to 764 μmol/min in first hour after infusion (*Brit. J. Pharmacol.* 1993, *108,* 627); influence of single dose (i.v) ouabain on haemodynamics, renal function and vasoactive hormones was investigated in healthy volunteers. It caused significantly reduction in average hourly heart rate and fall in diastolic blood pressure without significant change in systolic blood pressure. Ouabain injection was associated with fall in plasma angiotensin II level and rise in plasma adrenaline level, but plasma noradrenaline level remained unchanged (*Clin. Sci.* 1994, *86,* 391; *Chem. Abstr.* 1994, *121,* 124859 y).

STRYCHNOS (Strychnaceae)

S. ignatii Berg. syn. *S. maingayi* Cl. var. *fruticosa* Cl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 699).

Strychnine as major alkloid, pseudostrychnine, strychnine N-oxide, normelinonine B, isostrychnine, protostrychnine and 10-hydroxystrychnine as minor alkaloids along with quaternary alkaloids, macusine B and O-methylmacusine B isolated from roots and stemwood (*Planta Med.* 1990, *56,* 133).

S. ligustrina Blume; see *S. nux-vomica* L.

S. maingayi Cl. var. *fruticosa* Cl.; see *S. ignatii* Berg.

S. nux-vomica L. syn. *S. ligustrina* Blume (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 699).

Four new alkaloids - isobrucine, its N-oxide, isostrychnine N-oxide and 2-hydroxy-3-methoxystrychnine - isolated from heat-treated and untreated seeds and characterised by ^{13}C-NMR (*Shoyakugaku Zasshi* 1990, *44,* 42; *Chem. Abstr.* 1990, *113,* 237637 c; *Zhongguo Zhongyao*

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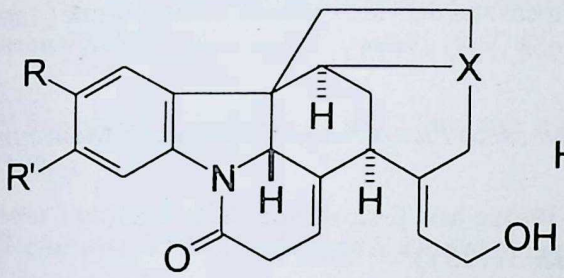
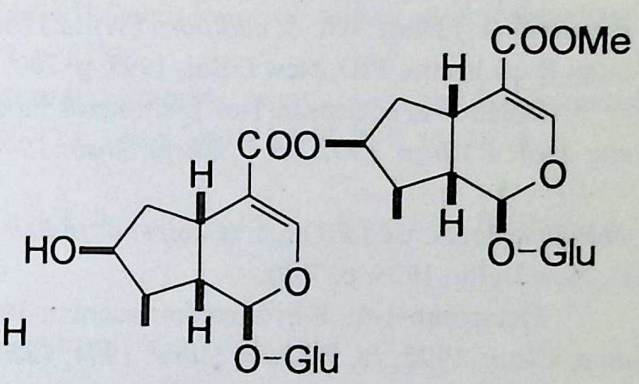
Zazhi 1993, *18,* 739; *Chem. Abstr.* 1994, *120,* 240093 x; *Yaoxue Xuebao* 1994, *29,* 44; *Chem. Abstr.* 1994, *120,* 330917 y); a bis-iridoid glucoside - ligustrinoside - isolated from wood and its structure determined; in addition, loganin, loganetin and loganic acid isolated (*Chem. Pharm. Bull.* 1991, *39,* 2737); strychnine, its N-oxide, isostrychnine, β-colubrine, pseudostrychnine, bruceine, its N-oxide, novacine, icajine and vomicine isolated from seeds (*Zhongguo Zhongyao Zazhi* 1993, *18,* 739; *Chem. Abstr.* 1994, *120,* 240093 x); stereocontrolled synthesis of strychnine (*J. Org. Chem.* 1994, *59,* 2685).

NEW COMPOUNDS





Isobrucine
R, R' = OMe, X = N
Isobrucine N-oxide
R, R' = OMe, X = N→O
Isostrychnine N-oxide
R, R' = H, X = N→O
2-Hydroxy-3-methoxystrychnine
R = OH, R' = OMe, X = N

Ligustrinoside

BIOLOGICAL ACTIVITY

Strychnine (1.0 to 100.0 μM) inhibited nicotinic stimulation of catecholamine release from bovine cultured adrenal chromaffin cells in concentration-dependent manner; it also inhibited nicotine-induced membrane depolarization and increase in intracellular Ca^{2+} concentration. Results suggest that strychnine interacts with agonist binding site of nicotinic acetylcholine receptors in chromaffin cells, thus exerting pharmacological effect independent of glycine receptor (*Brit. J. Pharmacol.* 1994, *113,* 471).

S. potatorum L.f. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 652).

Structure earlier proposed for mannogalactan from seeds revised (*Indian J. Pharm. Sci.* 1991, *53,* 53); harmane carboxamide, norharmane, cantleyine, 18,19-dihydrousambarensine, polyneuridine, akuammidine, nor-C-fluorocurarine, ochrolifuanine A, bisnordehydrotoxiferine, ochrolifuanine E, normacusine B, normavacurine, henningsamine, 11-methoxyhenningsamine,

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dihydrolongicaudatine, dihydrolongicaudatine Y, antirhine, 20(R)- and 20(S)-dihydroantirhine, 11-methoxy-12-hydroxydiaboline, diaboline, its N-oxide, 11-methoxydiaboline and deacetylretuline isolated from root bark (*Phytochemistry* 1992, *31*, 2873).

BIOLOGICAL ACTIVITY

Cholesterol and triglycerides reducing effect of mannogalactan was one-tenth and one-fifth respectively as compared to that of clofibrate (*Indian J. Pharm. Sci.* 1991, *53*, 53).

SUAEDA (Chenopodiaceae)

S. maritima (L.) Dum. syn. *S. nudiflora* (Willd.) Miq. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 700).

Isolation of octacosan-1-ol, β-sitosterol, lupeol and 8-hydroxydotriacontan-30-one (*Acta Cienc. Indica, Chem.* 1992, *18*, 7; *Chem. Abstr.* 1994, *121*, 31125 r).

S. monoica Forsk. ex J.F.Gmel. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 700).

Octacosan-1-ol, 8-hydroxydotriacontan-30-one and β-sitosterol isolated (*Acta Cienc. Indica, Chem.* 1992, *18*, 7; *Chem. Abstr.* 1994, *121*, 31125 r).

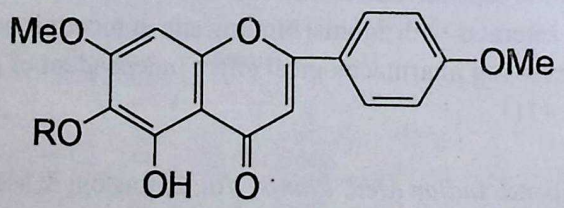
S. nudiflora (Willd.) Miq.; see *S. maritima* (L.) Dum.

SUREGADA (Euphorbiaceae)

S. multiflora (Juss.) Baill. syn. *Gelonium multiflorum* Juss. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 700).

A new diterpene lactone - 6β-acetoxygelomulide A - isolated and its stereostructure determined; gelomulide A and gelomulide D also isolated (*Indian J. Chem.* 1990, *39*B, 3); isolation of two new flavone glycosides - gelomulosides A and B - from seeds and their characterisation; in addition, 7,4'-O-dimethylscutellarein-6-O-glucoside isolated (*Phytochemistry* 1993, *33*, 493).

NEW COMPOUNDS



Gelomuloside A
R = Glu(2→1)Rha
Gelomuloside B
R = Glu(2→1)Xyl

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BIOLOGICAL ACTIVITY

Jolkinolide B exhibited potent activity in inducing nerve growth factor production in L-M cells (*Biosci., Biotechnol., Biochem.* 1994, *58,* 1749; *Chem. Abstr.* 1994, *121,* 246113 w).

SWERTIA (Gentianaceae)

S. affinis Clarke; see *S. angustifolia* Buch.-Ham. ex D.Don

S. angustifolia Buch.-Ham. ex D.Don syn. *S. angustifolia* Buch.-Ham. ex D.Don var. *pulchella* Burkill, *S. affinis* Clarke, *Ophelia angustifolia* D.Don (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 615).

Isolation of angustiamarin, angustioside, sweroside, swertiamarin and epieustomoside from whole plant (*Yaoxue Xuebao* 1992, *27,* 125; *Chem. Abstr.* 1992, *117,* 147163 y).

S. angustifolia Buch.-Ham. ex D.Don var. *pulchella* Burkill; see *S. angustifolia* Buch.-Ham. ex D.Don

S. chirata (Wall.) Clarke; see *S. chirayita* (Roxb. ex Flem.) Kars.

S. chirayita (Roxb. ex Flem.) Kars. syn. *S. chirata* (Wall.) Clarke, *Gentiana chirayita* Roxb. ex Flem., *Ophelia chirata* Griseb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 701).

Benzene extract suppressed in rats carrageenin-induced oedema significantly (43.6%) reduced both 5-HT-and bradykinin-induced hind paw oedema significantly (48.7 and 41.11% respectively) and that of prostaglandin- and dextran-induced oedema insignificantly. Extract possessed marked activity in granuloma pouch model (54.80%), significant activity (42.8%) in cotton pellet granuloma model of subacute arthritis, in both cases effect was comparable with that of phenylbutazone and betamethasone. It also inhibited formaldehyde-induced arthritis (58.33%) in early stage (*Fitoterapia* 1992, *63,* 122).

A new hopane triterpenoid - chiratenol - isolated and characterised (*Tetrahedron Lett.* 1990, *31,* 7649); chemical studies and ^{13}C-NMR of swertanone (*Tetrahedron* 1991, *47,* 2337); isolation of a new xanthone - swerchirin - and its structure elucidation (*Planta Med.* 1991, *57,* 102; *Phytochemistry* 1991, *30,* 1037); another xanthone - chiratol - isolated and characterised; in addition, 7-O-methylswertianin isolated (*Phytochemistry* 1991, *30,* 1037); two new triterpenes - swertenol and episwertenol - isolated and their structures determined (*Phytochemistry* 1991, *30,* 4087); a new swertane triterpenoid isolated and characterised as swerta-7,9(11)-dien-3β-ol; in addition, pichierenol isolated (*Indian J. Chem.* 1992, *31*B, 70); another triterpenoid - kairatenol - isolated and its structure established (*Tetrahedron Lett.* 1992, *33,* 125); six xanthone derivatives (SC-I to SC-VI) isolated and identified as 1,7,8-trihydroxy-3-methoxyxanthone, 1,5,6-trihydroxy-3-methoxyxanthone, 1,8-dihydroxy-3,5-dimethoxyxanthone, 1-hydroxy-3,5,8-trimethoxy-

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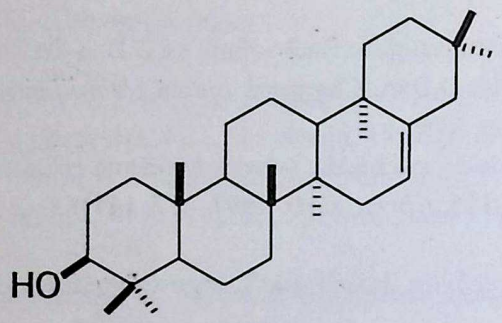
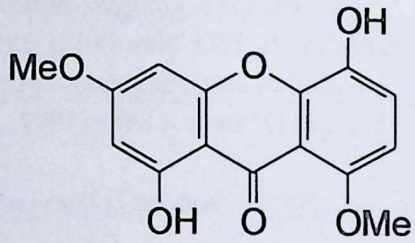
xanthone, chiratanin and 1,5,8-trihydroxy-3-methoxyxanthone respectively (*Fitoterapia* 1992, *63*, 122); a hepatoprotective lignan, (–)syringaresinol, isolated from aerial parts along with mangiferin, 1,5,8-trihydroxy-3-methoxyxanthone, 1-hydroxy-3,5,8-trimethoxyxanthone, 1-hydroxy-3,7,8-trimethoxyxanthone and three bitter iridoid glycosides, amarogentin, sweroside and amaroswerin (*Indian J. Chem.* 1994, *33*B, 405).

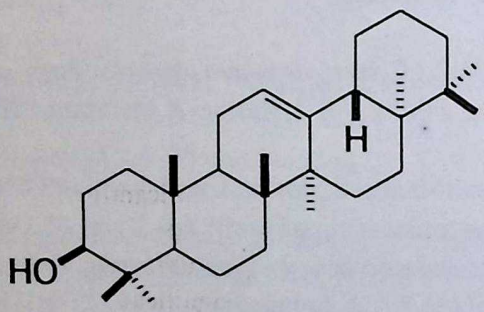
NEW COMPOUNDS



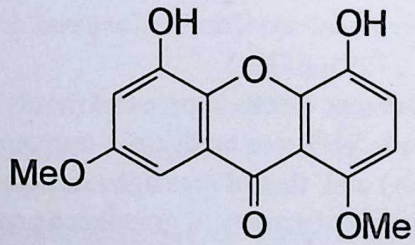
Chiratenol



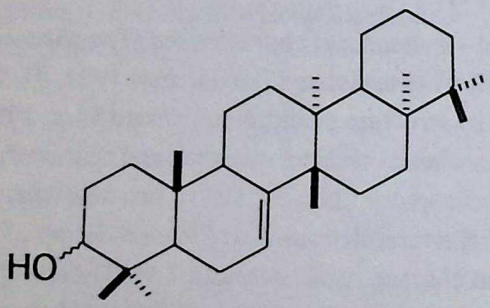
Chiratol



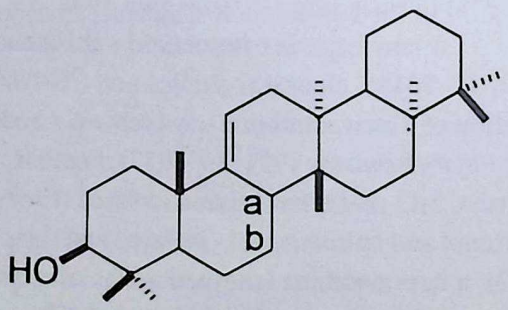
Kairatenol



Swerchirin



Swertanol
~~ = β
Episwertanol
~~ = α



Pichierenol
Swerta-7,9(11)-dien-3β-ol
ab = Δ

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BIOLOGICAL ACTIVITY

Swerchirin exhibited hypoglycaemic effect in fasted, fed, glucose-loaded and tolbutamide pretreated albino rats. It lowered blood sugar (40.0%) in CF male rats with ED50 23.1 mg/kg, oral (*Planta Med.* 1991, *57,* 102); administration of swerchirin (50.0 mg/kg, p.o.) caused very significant lowering of blood sugar at 7 hr in healthy and streptozotocin (35.0 mg/kg, i.v. treated rats (*Indian J. Exp. Biol.* 1991, *29,* 674).

S. cordata Wall. ex Clarke (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 616).

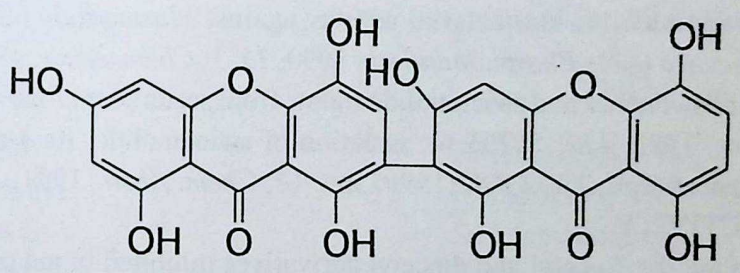
Two new xanthones isolated and characterised as 1-hydroxy-3,5,7,8-tetramethoxy-xanthone and 1,7-dihydroxy-3,5,8-trimethoxyxanthone (*J. Nat. Prod.* 1994, *57,* 134).

S. macrosperma Clarke

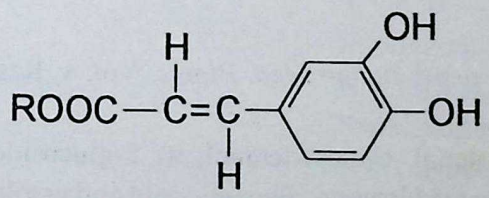
A new bis-xanthone - swertiabisxanthone - isolated and its structure elucidated (*Phytochemistry* 1989, *28,* 3569); isolation and chatacterisation of a new ester - swertiamacroside - from dried plant; bellidifolin, its 8-O-glucoside and mangiferin also isolated (*Yaoxue Xuebao* 1990, *25,* 123; *Chem. Abstr.* 1990, *113,* 74793 j).

Distribution: Khasi hills, alt. 1200-1800 m.

NEW COMPOUNDS



Swertiabisxanthone



Swertiamacroside

R = Glu(6→1)Rha

S. nervosa Wall. ex DC. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 656).

Isolation of nervoside, vegeloside, its 7α-O-methyl isomer, sweroside and swertiamarin (*Zhiwu Xuebao* 1993, *35,* 307; *Chem. Abstr.* 1994, *120,* 101911 z).

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S. petiolata Royle (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 702).

Isolation of a new tetraoxygenated xanthone glycoside from aerial parts and its characterisation as 1-glucosyloxy-3-hydroxy-5,8-dimethoxyxanthone; in addition, 1,8-dihydroxy-3,5-dimethoxyxanthone, 1,3-dihydroxy-7-methoxyxanthone and 1,7-dihydroxy-3-methoxyxanthone isolated (*Phytochemistry* 1990, *29,* 1265).

S. speciosa D.Don syn. *S. speciosa* D.Don var. *perfoliata* (G.Don) Clarke (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 702).

Aerial parts afforded 1-hydroxy-3,7,8-trimethoxyxanthone, 1,3-dihydroxy-5,8-dimethoxyxanthone, 5,7,4'-trihydroxyflavone and 5-glucosyloxy-7-hydroxy-3',4'-dimethoxyflavone (*Himalayan Chem. Pharm. Bull.* 1991, *8,* 31; *Chem. Abstr.* 1992, *116,* 148237 s).

S. speciosa D.Don var. *perfoliata* (G.Don) Clarke; see *S. speciosa* D.Don

SWIETENIA (Meliaceae)

S. macrophylla King (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 617).

Seed extract exhibited antimalarial activity against *Plasmodium falciparum* Strain F-2382 and 1-2300 *in vitro* (*Acta Pharm. Indonesia* 1990, *15,* 1; *Chem. Abstr.* 1992, *117,* 55753 n).

Isolation of swietenin and swietenolide tiglate from seeds (*Acta Pharm. Indonesia* 1990, *15,* 1; *Chem. Abstr.* 1992, *117,* 55753 n); isolation of swietenolide, its 3-acetyl and diacetyl derivatives from leaves (Jpn. 2,152,978 (1990) Jun. 12; *Chem. Abstr.* 1991, *114,* 49560 u).

BIOLOGICAL ACTIVITY

Swietenolide, its 3-acetyl and diacetyl derivatives inhibited blood platelet aggregation (35.1, 91.6 and 87.3% respectively) (Jpn. 2,152,978 (1990) Jun. 12; *Chem. Abstr.* 1991, *114,* 49560 u).

S. mahagoni (L.) Jacq. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 703).

Isolation of cycloartenol, cycloswietenol, its 3-glucoside, 31-norcycloswietenol, its glucoside, β-sitosterol, acacic acid lactone, oleanolic acid and ursolic acid from leaves (*Indian J. Pharm. Sci.* 1989, *51,* 22); eight new tetranortriterpenoids - swietenins B, C, D, E and F, 3-O-acetyl, 6-O-acetyl and 3-O-tigloyl-6-O-acetyl derivatives of swietenolide - isolated from cotyledons and characterised by 2D-NMR; in addition, swietenin , its acetate, swietenolide and its 3,6-di-O-acetyl and 3-O-tigloyl derivatives, khayasin T, proceranolide, methyl angolensate, 7-deacetoxy-7-oxogedunin and 6α-acetoxygedunin isolated (*Chem. Pharm. Bull.* 1990, *38,* 639); six new tetranortriterpenoids - swietemahonins B, C, D, F and G and swietemahonolide - isolated from seeds and characterised by ^{13}C-NMR and 2D-NMR; in addition, swietemahonins A and E isolated

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(*Chem. Pharm. Bull.* 1990, *38,* 894); a new dimeric triterpenoid - mahagonin - isolated from seeds and its structure established (*Tetrahedron Lett.* 1990, *31,* 5943); isolation of mahonin and secomahoganin from cotyledons (*Chem. Pharm. Bull.* 1990, *38,* 1495); a new polyacetylene (I) isolated from plant and characterised as α-hexyl-3-(6-hydroxy-2,4-octadiynyl)oxiranemethanol (*J. Nat. Prod.* 1991, *54,* 1419); a new triterpene (II) isolated from stem bark and its structure elucidated as 31-nor-20-methylene-22-methyl-9,19-cycloartan-2α,3β-diol; in addition, friedelin, α- and β-amyrins, sitosterol, mannitol and oleanolic, ursolic and ellagic acids isolated (*Indian J. Chem.* 1991, *30*B, 462); total lipid content in seeds of plant from Central India determined as 59.4% (*J. Food Sci. Technol.* 1993, *30,* 54; *Chem. Abstr.* 1993, *119,* 115831 q).

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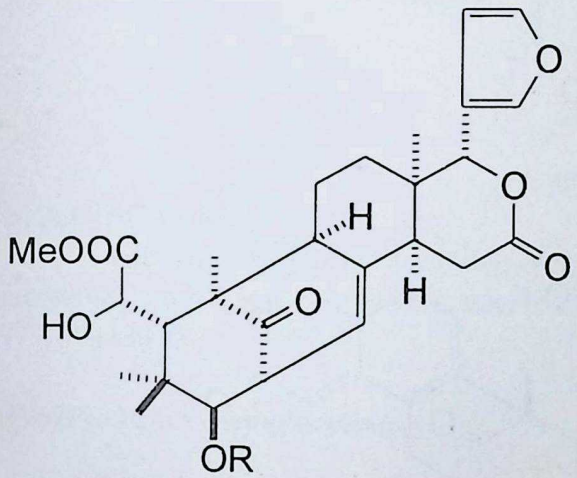
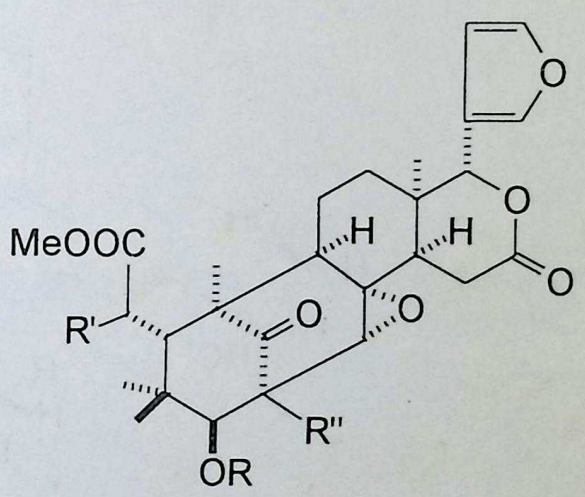
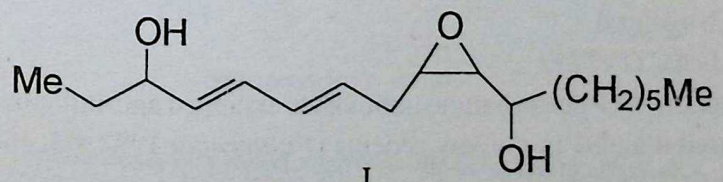


Swietenin B
R = Propionyl
Swietenin C
R = Isobutyryl
Swietenin D
R = Methacryloyl
Swietenin E
R = 2-Me Butyryl
Swietenin F
R = Benzoyl



Swietemahonin B
R = Propionyl, R' = OAc, R" = H
Swietemahonin C
R = Isobutyryl, R' = OAc, R" = H
Swietemahonin D
R = Acetyl, R' = OH, R" = H
Swietemahonin F
R = Tigloyl, R' = OAc, R" = H
Swietemahonin G
R = Tigloyl, R',R" = OH
Swietemahonolide
R = Tigloyl, R',R" = H



I

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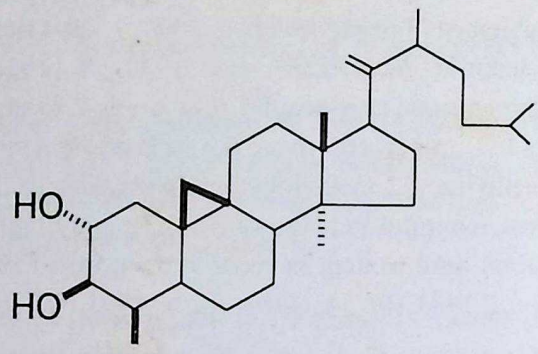
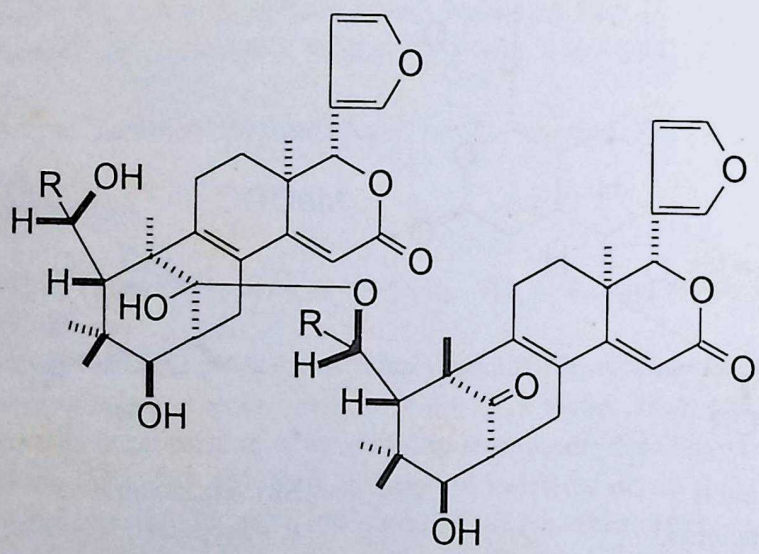


II



Mahagonin
R = COOMe

SYMPHOREMA (Symphorematacea)

S. involucratum Roxb.

Tel. - Surudu, Kondatekkali, Gubbadaara.

Quercetin-3-O-glucorhamnoarabinoside isolated from fresh water flowers (*Fitoterapia* 1992, *63*, 465).

Distribution : Deccan Peninsula, ascending to 1200 m, Bihar, Orissa, Madhya Pradesh and Nagaland.

BIOLOGICAL ACTIVITY

Quercetin-3-O-glucorhamnoarabinoside exhibited anti-inflammatory activity comparable to that of phenylbutazone in rat paw oedema (*Fitoterapia* 1992, *63*, 465).

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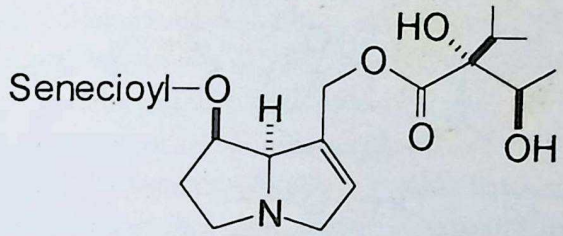
SYMPHYTUM (Boraginaceae)

S. asperum Lepech. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 658).

A new pyrrolizidine alkaloid - symviridine - isolated and characterised (*Phytochemistry* 1992, *31,* 4041).

NEW COMPOUNDS



Symviridine

BIOLOGICAL ACTIVITY

Glucofructan (GF) (1.0 mg/kg) stimulated antibodyforming cell generation and IL-2 secretion 3.5 times and 1.5 times respetively (*Ann. N.Y. Acad. Sci.* 1993, 383; *Chem. Abstr.* 1993, *119,* 174138 s).

SYMPLOCOS (Symplocaceae)

S. racemosa Roxb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 619).

A new flavan glycoside - symposide - isolated from stem bark and characterised; α-amyrin and β-sitosterol also isolated (*Indian J. Chem.* 1989, *28*B, 982); isolation of three new triterpenoids from stem bark and their characterisation as 28-hydroxy-20α-urs-12,18(19)-dien-3β-yl acetate, 3-oxo-20α-urs-12,18(19)-dien-28-oic acid and 24-hydroxyolean-12-en-3-one; in addition, betulin and oleanolic acid isolated (*Phytochemistry* 1990, *29,* 3601).

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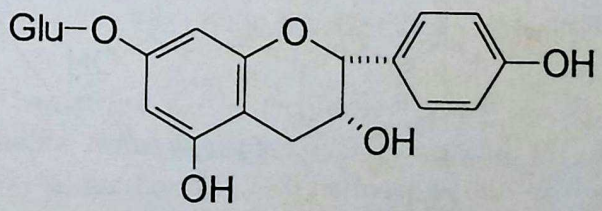

Symposide

BIOLOGICAL ACTIVITY

Symposide and (−)epiafzelechin showed antifibrinolytic activity (*Indian J. Chem.* 1989, *28*B, 982).

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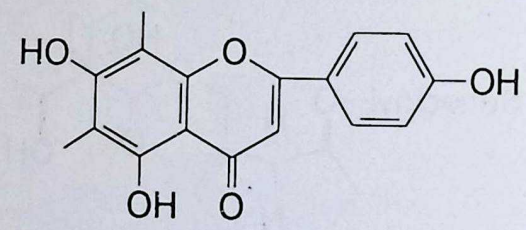
SYZYGIUM (Myrtaceae)

S. alternifolium (Wight) Walp. syn. *Eugenia alternifolia* Wight (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 705).

A new C-methylated flavone - syzalterin - isolated from leaves and its structure elucidated (*Indian J. Chem.* 1991, *30*B, 66).

NEW COMPOUNDS



Syzalterin

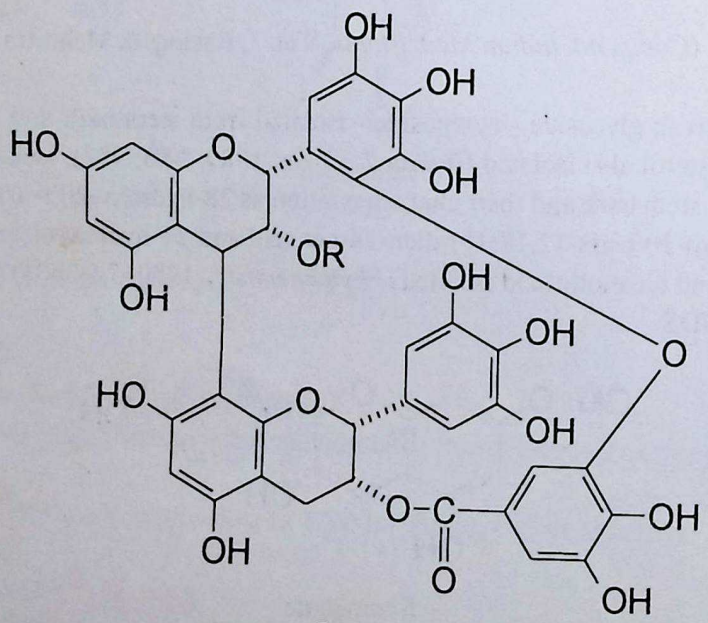
S. aqueum (Burm.f.) Alston syn. *Eugenia aquea* Brum.f.

Eng.- Watery rose apple; Tel. - Gulaabijaamichettu, Gulaabijamikaayalu; Khasi - Dieng-soh-liwa.

Two proanthocyanidins - samarangenins A and B - isolated from leaves and characterised (*Chem. Pharm. Bull.* 1992, *40*, 2671).

Distribution: Assam, Bengal and Meghalaya, ascending to 1300 m.

NEW COMPOUNDS



Samarangenin A
R = H
Samarangenin B
R = Galloyl

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S. aromaticum (L.) Murr. & Perry syn. *Eugenia caryophyllata* Thunb., *E. caryophyllus* (Spreng.) Bullock & Harrison (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 705).

Extract leaves containing 3,4-dihydroxyphenethyl alcohol and 3,4-dihydroxybenzoic acid exhibited anti-inflammatory activity (CN 1,030,184 (1989) Jan. 11; *Chem. Abstr.* 1990, *113,* 29242 t).

β-Caryophyllene, its oxide, α-humulene, its epoxide and eugenol isolated (*J. Nat. Prod.* 1992, *55,* 999); eugenol-4-O-β-D-(6'-O-galloyl)-glucoside, 2-methyl-5,7-dihydroxychromone-8C-β-D-glucoside, its 6'-O-gallate, 2,4,6-trihydroxyacetophenone-3C-β-D-glucoside, its 2'-O-, 6'-O-, 2',3'-di-O-, 2',6'-di-O-, 2',3',6'-tri-O-, 2',3',4',6'-tetra-O-gallates and 2',3'-di-O-galloyl-4',6'-O-(S)-hexahydroxydiphenoyl ester isolated; in addition veloneic acid bislactone, gallic acid-3-O-β-D-(6'-O-galloyl)glucoside, 4-hydroxy-3-methoxyphenol-1-O-β-D-(6'-O-galloyl)-glucoside, 2,3-di-O-, 1,2,3,6-tetra-O-,1,2,3,4,6-penta-O-galloylglucose, strictinin, gemin D, eugeniin, 1-desgalloyl eugeniin, 1(β)-O-galloylpedunculagin, rugosin A, casuariin, pterocarinin A and rugosins E and D isolated (*Chem. Pharm. Bull.* 1993, *41,* 1232).

BIOLOGICAL ACTIVITY

β-Caryophyllene, its oxide, α-humulene, its epoxide and eugenol exhibited significant activity as inducers of detoxifying enzyme glutathione-S-transferase in mouse liver and small intestine. They inhibited chemical carcinogenesis and may find use as potential anticarcinogenic agents (*J. Nat. Prod.* 1992, *55,* 999).

S. cuminii (L.) Skeels syn. *Eugenia jambolana* Lam. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 660).

Isolation of dihydromyricetin from leaves (Jpn. 1,175,932 (1989) Jul. 12; *Chem. Abstr.* 1990, *112,* 42558 z); isorhamnetin-3-O-rutinoside isolated (*J. Indian Chem. Soc.* 1990, *67,* 785); myrcene, β-pinene, α-terpinene, terpinolene, β-phellandrene, bornylene, cuminaldehyde, α-terpineol, eugenol and borneol identified in essential oil (*Indian Perfum.* 1991, *35,* 112; *Chem. Abstr.* 1991, *115,* 252104 m); a new flavonoid - myricetin-3-O-robinoside - isolated from roots along with myricetin-3-O-glucoside (*Fitoterapia* 1992, *63,* 259).

BIOLOGICAL ACTIVITY

Dihydromyricetin (0.16 μM) inhibited (34.4%) mutation in *Salmonella typhimurins* as compared to control (Jpn. 1,175,932 (1989) Jul. 12; *Chem. Abstr.* 1990, *112,* 42558 z).

S. operculatum (Roxb.) Niedenzu syn. *Cleistocalyx operculatus* (Roxb.) Merr. & Perry (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 238).

2',4'-Dihydroxy-6'-methoxy-3',5'-dimethylchalcone, 5,7-dihydroxy-6,8-dimethylflavone, 7-hydroxy-5-methoxy-6,8-dimethylflavanone, ethyl gallate, gallic acid, ursolic acid, cinnamic acid and β-sitosterol isolated from flower buds (*Zhiwu Xuebao* 1990, *32,* 469; *Chem. Abstr.* 1991, *114,* 98203 p); arjunolic acid isolated from bark as antidermatophytosis constituent (*Shoyakugaku Zasshi* 1993, *47,* 408; *Chem. Abstr.* 1994, *121,* 42528 a).

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S. samarangense (Bl.) Merr. & Perry syn. *Eugenia javanica* Lamk., p.p. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 706).

Two proanthocyanidins - samarangenins A and B - isolated from leaves and characterised (*Chem. Pharm. Bull.* 1992, *40,* 2671).

TABEBUIA (Bignoniaceae)

T. pentaphylla (L.) Hemsl. syn. *Tecoma pentaphylla* Juss. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 706).

β-Lapachone synthesised (*J. Heterocycl. Chem.* 1992, *29,* 1457; *Chem. Abstr.* 1993, *118,* 124231 a).

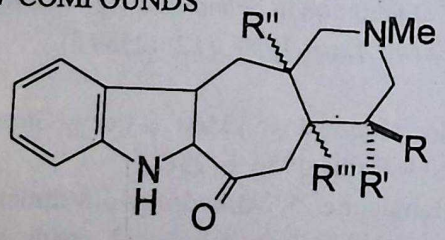
TABERNAEMONTANA (Apocynaceae)

T. coronaria R.Br.; see *T. divaricata* (L.) R.Br. ex R. & S.

T. divaricata (L.) R.Br. ex R. & S. syn. *T. coronaria* R.Br., *Ervatamia coronaria* Stapf, *E. divaricata* (L.) Alston (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 707).

Isolation of janetine, hydroxyindolenine and voaphylline from flowers (*Rev. Cubana Farm.* 1989, *23,* 141; *Chem. Abstr.* 1990, *112,* 115817 v); indole alkaloids (I and II) isolated from whole plant and their structures determined (Jpn. 1,272,582 (1989) Oct. 31; *Chem. Abstr.* 1990, *112,* 185774 c); isolation of a new alkaloid - 11-methoxy-N-methyl-dihydropericyclivine - and its structure elucidation; in addition, voacangine, voacristine, isovoacristine, coronaridine, isovoacangine, 19-epivoacangine, vobasine and tabernaemontanine isolated (*Phytochemistry* 1991, *30,* 1740); a new alkaloid - voaharine - and a dimeric alkaloid - conophylline - isolated from leaves and their structures established by X-ray analysis (*Tetrahedron Lett.* 1992, *33,* 969; *J. Nat. Prod.* 1993, *56,* 1865); isolation of another new dimeric alkaloid - conophyllidine - from leaves; voacangine, apparicine, 19-epivoacristine, voacristine and its 7-hydroxyindolenene also isolated; crystal structure of new compound determined (*J. Nat. Prod.* 1993, *56,* 1865).

NEW COMPOUNDS

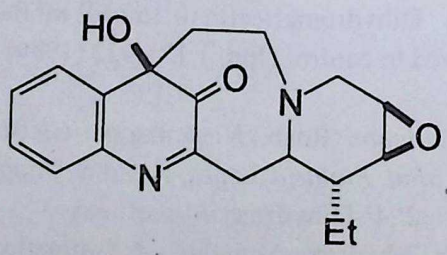


I

R = H, R' = Et, R'' = β-COOMe, R''' = β-H

II

R = Et, R' = H, R'' = α or β-COOMe, R''' = α or β-OH



Voaharine

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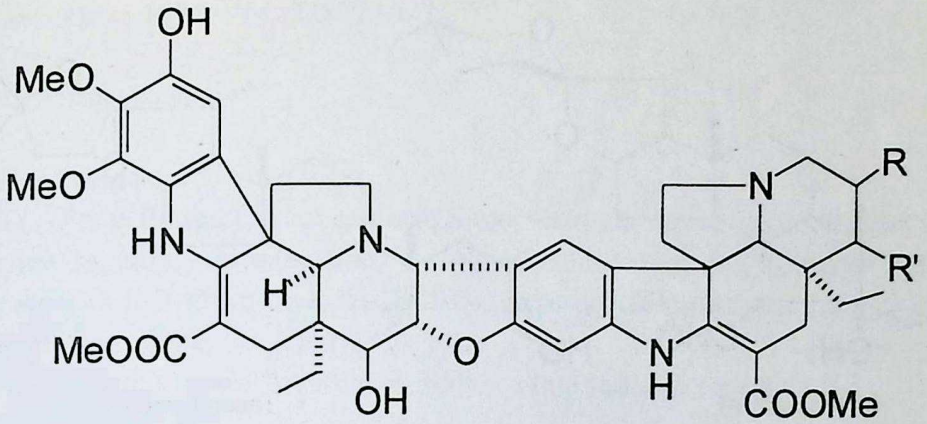
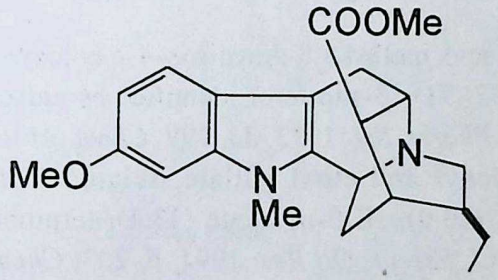


Conophylline
RR' = -O-
Conophyllidine
RR' = Δ



11-Methoxy-N-methyl dihydropericyclivine

BIOLOGICAL ACTIVITY

Indole alkaloid (I) inhibited HCl-induced ulcer in mice by 48.8% (Jpn. 1,272,582 (1989) Oct. 31; *Chem. Abstr.* 1990, *112,* 185774 c).

TACCA (Taccaceae)

T. leontopetaloides (L.) O.Kuntze syn. *T. pinnatifida* Forst. & Forst.f. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 399).

Isolation and structure determination of taccagenin from acid hydrolysate of leaf extract: spirost-5-ene-3,25,27-triol also obtained (*Phytochemistry* 1990, *29,* 1643); a spirostane - leontogenin - isolated from acid hydrolysate of extract of leaves and characterised as 25(R)-B-nor(7)-6β-formylspirostane-3β,5β-diol (*Phytochemistry* 1990, *29,* 2623); diosgenin and its F ring hydroxylated derivatives, isonarthogenin and isonuatigenin, together with nuatigenin isolated from acid hydrolysate of leaf extract; a diosgenin ester, which arose as an artefact during acid hydrolysis also isolated (*Planta Med.* 1990, *56,* 218).

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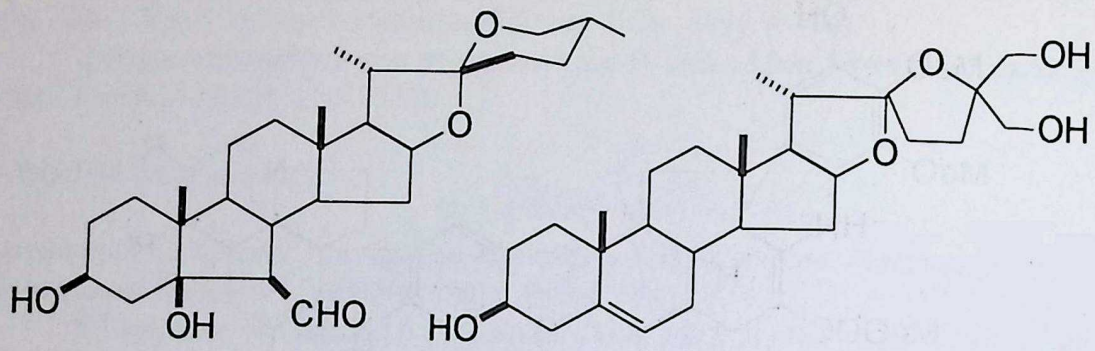

Leontogenin Taccagenin

T. pinnatifida Forst. & Forst.f.; see *T. leontopetaloides* (L.) O.Kuntze

TAGETES (Asteraceae)

T. erecta L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 708).

Isolation of syringic acid, methyl 3,5-dihydroxy-4-methoxybenzoate and quercetin from flowers (*Fitoterapia* 1991, *62,* 91); β-sitosterol identified as aglycone in glycosides isolated from Libyan plant (*Egypt. J. Pharm. Sci.* 1992, *33,* 599; *Chem. Abstr.* 1994, *120,* 265798 u); 5-(but-1-ol-3-ynyl)-2,2'-bithienyl and ethyl gallate isolated (*Fitoterapia* 1992, *63,* 85); determination of piperitone (20.0), (E)β-ocimene (13.1), terpinolene (12.4) and limonene (11.0%) in leaf essential oil (*J. Essent. Oil Res.* 1994, *6,* 203; *Chem. Abstr.* 1994, *121,* 78288 m).

T. glandulifera Schrank; see *T. minuta* L.

T. minuta L. syn. *T. glandulifera* Schrank (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p.708).

(Z)β-Ocimene (39.44), dihydrotagetone (15.43), (E)ocimenone (14.83), (Z)ocimenone (9.15) and (Z)tagetone (8.78%) determined in flower essential oil by GC-MS (*J. Essent. Oil Res.* 1992, *4,* 525; *Chem. Abstr.* 1993, *118,* 197754 h); 2,2',5',2"-terthiophene, 5-methyl-2,2',5',2"-terthiophene, 5-(but-3-en-1-ynyl)-2,2'-bithiophene and 5 -(but-3-en-1-ynyl)-5'-methyl-2,2'-bithiophene identified in flower oil (*J. High Resolut. Chromatogr.* 1993, *16,* 53; *Chem. Abstr.* 1993, *118,* 251465 e).

T. signata Bartl.; see *T. tenuifolia* Cav.

T. tenuifolia Cav. syn. *T. signata* Bartl. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 708).

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Four phototoxic polyacetylenic and four thiophenic compounds isolated (*Phyton* 1990, *51*, 99; *Chem. Abstr.* 1991, *115*, 228323 m).

TALINUM (Portulacaceae)

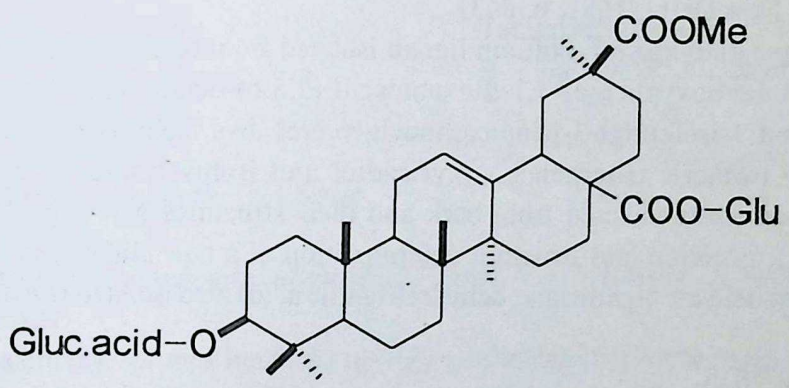
T. triangulare Willd.

Eng. - Fame flower, Ceylon spinach, Sweet heart and Surinam purslane.

A new saponin - talinumoside I - isolated from leaves and characterised as methyl spergulagenate-3-O-β-D-glucuronosido-28-β-D-glucoside; chikusetsusaponin IVa also isolated (*Chem. Pharm. Bull.* 1992, *40*, 2557).

Distribution: Native of tropical America, introduced into India in Tamil Nadu.

NEW COMPOUNDS



Talinumoside I

TAMARINDUS (Caesalpiniaceae)

T. indica L. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 625).

Ethanolic extract of seed coat exhibited antioxidant activity (*J. Agric. Food Chem.* 1994, *42*, 2671; *Chem. Abstr.* 1994, *121*, 299533 q).

A new bitter principle - tamarindienal - isolated from fruit pulp and characterised as 5-hydroxy-2-oxo-hexa-3,5-dienal (*Fitoterapia* 1992, *63*, 537); a polysaccharide isolated (*Anticancer Drugs* 1993, *4*, 209; *Chem. Abstr.* 1993, *119*, 85638 n); isolation of 2-hydroxy-3',4'-dihydroxyacetophenone (TA0), methyl 3,4-dihydroxybenzoate (TA1), 3,4-dihydroxyphenyl acetate (TA2) and (–)epicatechin from seeds (*J. Agric. Food Chem.* 1994, *42*, 2671; *Chem. Abstr.* 1994, *121*, 299533 q).

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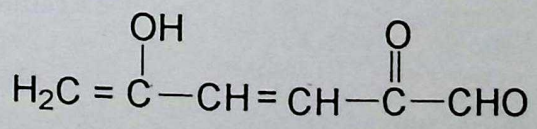

Tamarindienal

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BIOLOGICAL ACTIVITY

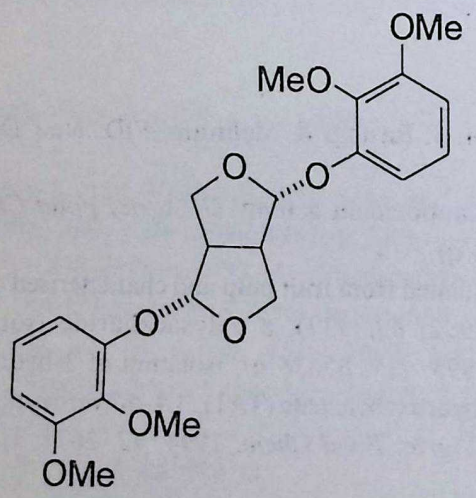
Polysaccharide showed immunomodulatory activities such as phagocytic enhancement, leukocyte migration inhibition and inhibition of lymphocyte proliferation (*Anticancer Drugs* 1993, *4*, 209; *Chem. Abstr.* 1993, *119*, 85638 n); TA0, TA1 and TA2 exhibited strong antioxidant activity in linoleic acid auto-oxidation system (*J. Agric. Food Chem.* 1994, *42*, 2671; *Chem. Abstr.* 1994, *121*, 299533 q); tamarindienal showed fungicidal activity against *Aspergillus niger* and *Candida albicans* and strong bactericidal activity against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* (*Fitoterapia* 1992, *63*, 537).

TAMARIX (Tamaricaceae)

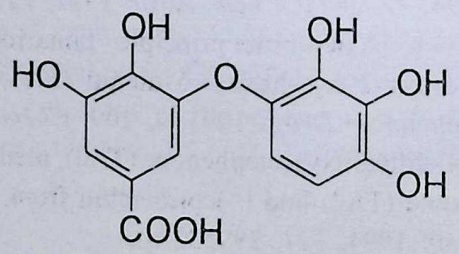
T. aphylla (L.) Karst. syn. *T. auriculata* Vahl (*Compend. Indian Med. Plants*, Vol. 2, Rastogi & Mehrotra, PID, New.Delhi, 1991, p. 663).

A unique diaryloxyfuranofuran lignan isolated from bark and characterised as 2e,6e-bis(1-oxy-2,3-dimethoxyphenyl)-3,7-dioxabicyclo-[3,3,o)-octane (I); 1'-decarboxydehydro-digallic acid and 1-isoferulyl-3-pentacosanoylglycerol also isolated (*Phytochemistry* 1991, *30*, 3763); two isomeric triterpenes - myricadiol and isomyricadiol - and 28-hydroxy-D-friedoolean-14-en-3-one isolated from bark and their structures determined (*Phytochemistry* 1992, *31*, 4031); isolation and structure determination of a new ellagitannin - tamarixellagic acid - from galls; dehydrodigallic and dehydrotrigallic acids also isolated (*Phytochemistry* 1994, *35*, 1349).

NEW COMPOUNDS



I



1'-Decarboxydehydrodigallic acid

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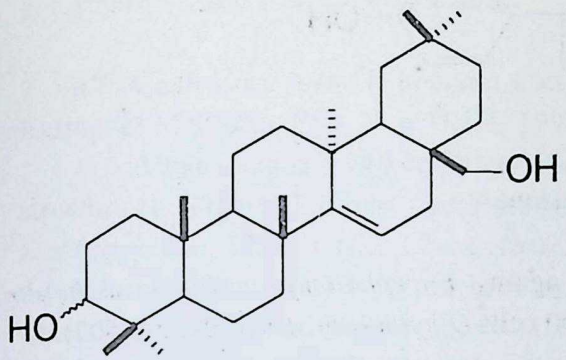
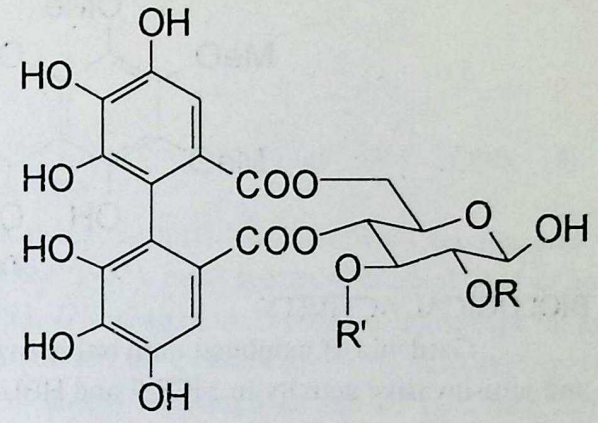




Isomyricadiol
~~ = α
Myricadiol
~~ = β

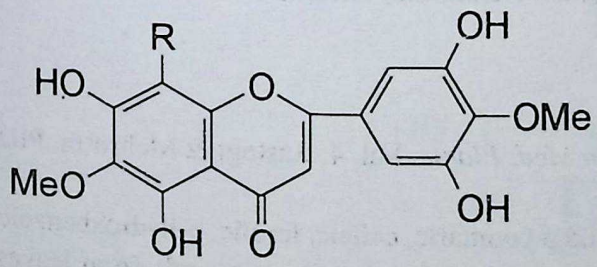
Tamarixellagic acid
R = Galloyl, R' = Dehydrodigalloyl

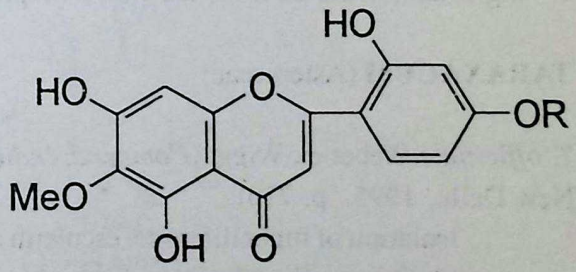
T. articulata Vahl; see *T. aphylla* (L.) Karst.

T. dioica Roxb. ex Roth (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 625).

Hentriacontan-7-ol and hentriacont-7(Z)-ene isolated (*Planta Med.* 1991, *57,* 397); two new flavones - tamaridone and tamadone - isolated from aerial parts and their structures determined; hexacosyl p-coumarate, gardenins A, B, C and E, nevadensin A and apigenin also obtained (*Phytochemistry* 1994, *36,* 507); three new 2-phenyl-4H-1-benzopyran-4-ones isolated from aerial parts as an inseparable mixture and characterised as 5,7-dihydroxy-6,8-dimethoxy-2-(3,5-dihydroxy-4-methoxyphenyl)-4H-1-benzopyran-4-one (I), 5,7-dihydroxy-6-methoxy-2-(3,5-dihydroxy-4-methoxyphenyl)-4H-1-benzopyran-4-one (II) and 5,7-dihydroxy-6-methoxy-2-(2,4-dihydroxyphenyl)-4H-1-benzopyran-4-one (III) (*Indian J. Chem.* 1994, *33*B, 305).

NEW COMPOUNDS





I
R = OMe
II
R = H

III
R = H
Tamaridone
R = Me

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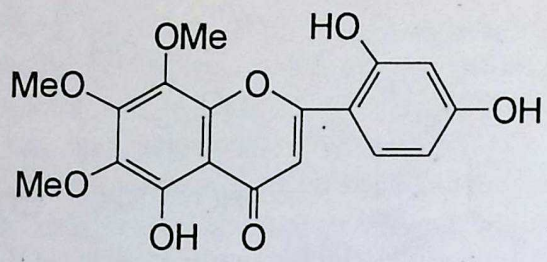

Tamadone

BIOLOGICAL ACTIVITY

Gardenin B exhibited antiviral activity against *Encephalomyocarditis* virus *in vitro* and anti-invasive activity in MCF-7 and HBL-100 cells (*Phytochemistry* 1994, *36,* 507).

TANACETUM (Asteraceae)

T. dolichophyllum (Kitamura) Kitamura syn. *T. longifolium* Wall. ex DC., *T. himachalensis* Aswal & Mehrotra

Isolation of β-thujone, cis-dehydromatricarin ester, spiroketal enol ether polyine, artemetin, umbelliferone and β-sitosterol from aerial parts (*Fitoterapia* 1993, *64,* 284); trans-sabinyl acetate (43.2) and trans-sabinol (12.7%) determined in blue colour oil of aerial parts and terpinen-4-ol (25.8), sabinene (23.4) and p-cymene (12.3%) determined in yellow colour oil of roots (*J. Essent. Oil Res.* 1993, *5,* 597; *Chem. Abstr.* 1994, *121,* 104058 h).
Distribution: Himalayas, from Kashmir to Nepal, alt. 3000-4200 m.

T. gracile Hook.f. & Thoms. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 239).

β-Thujone, ketopelenolide B and artemetin isolated (*Fitoterapia* 1993, *64,* 284).

T. himachalensis Aswal & Mehrotra; see *T. dolichophyllum* (Kitamura) Kitamura

T. longifolium Wall. ex DC.; see *T. dolichophyllum* (Kitamura) Kitamura

TARAXACUM (Asteraceae)

T. officinale Weber ex Wigg. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 710).

Isolation of umbelliferone, esculetin and p-coumaric, caffeic, ferulic, p-hydroxbenzoic, protocatechuic, vanillic, β-resorcylic, syringic and p-hydroxyphenylacetic acids from leaves, flowers and roots; 3-O-β-D-glucopyranosides and 3,7-di-O-β-glucopyranosides of quercetin, luteolin and isorhamnetin, luteolin-7-O-glucoside, luteolin-4'-O-β-D-glucoside, luteolin-7-O-(6"-O-α-L-rhamnosyl)-β-D-glucoside and quercetin-7-O-β-D-glucoside also isolated from leaves and blossoms (*Acta Pol. Pharm.* 1993, *50,* 153; *Chem. Abstr.* 1994, *121,* 5106 r).

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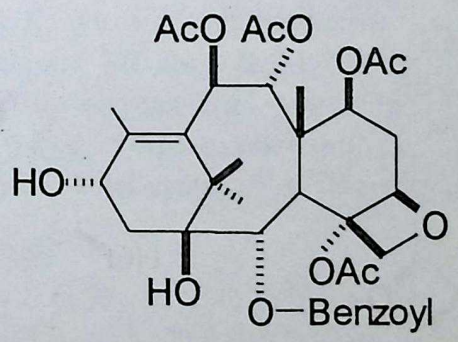
TAXUS (Taxaceae)

T. baccata L.; see *T. wallichiana* Zucc.

T. wallichiana Zucc. syn. *T. baccata* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 710).

A new taxane - 14β-hydroxy-10-deacetylbaccatin III - isolated from needles and its structure elucidated (*J. Chem. Soc.* Perkin 1 1992, 2925); mass spectrum of taxol (*J. Am. Soc. Mass Spectrom.* 1992, *3,* 672; *Chem. Abstr.* 1993, *118,* 124818 x); two new oxetane-type taxane diterpenoids (I and II) isolated and characterised as 2-debenzoyl-14β-benzoyloxy-10-deacetylbaccatin III and 10,15-epoxy-11(15→1)abeo-10-deacetylbaccatin III (*J. Chem. Soc.* Perkin 1, 1993, 1563); taxol (0.045-0.13%), 10-deacetylbaccatin III and brevifoliol isolated; structure of brevifoliol revised (*Bioorg. Med. Chem. Lett.* 1993, *3,* 1345; *Chem. Abstr.* 1994, *120,* 129486 p; *Phytochemistry* 1993, *33,* 145); five more new taxanes - 13-deacetylbaccatin VI, 13-acetylbrevifoliol, 7,13-diacetyl-7-debenzoylbrevifoliol, 7-debenzoyl-10β-hydroxy-brevifoliol and 7-acetyl-10-deacetyl-7-debenzoylbrevifoliol - from needles and their structure elucidation; 14β-hydroxy-10-deacetylbaccatin III and 1β-hydroxybaccatin I also isolated (*Phytochemistry* 1993, *33,* 145); review article on chemistry of taxol and structure-activity relationship (*Trends Biotechnol.* 1994, *12,* 222; *Chem. Abstr.* 1994, *121,* 109281 k); a new taxoid - wallifoliol - isolated from needles and its structure determined; in addition, cephalomannine, 10-deacetylbaccatin III, brevifoliol and 2-acetoxybrevifoliol isolated (*J. Nat. Prod.* 1994, *57,* 862); a new lignan - (-)3-demethyl-secoisolariciresinol - and a new phenolic glucoside - taxuside - isolated from needles and their structures elucidated (*Phytochemistry* 1993, *33,* 1489); two new hydroxylated apocarotenoids isolated and characterised as deglycosylicariside B4 and 12-dehydrodeglycosylicariside B4 by synthesis; dehydrovomifoliol and vomifoliol also isolated (*Fitoterapia* 1993, *64,* 396).

NEW COMPOUNDS



13-Deacetylbaccatin VI

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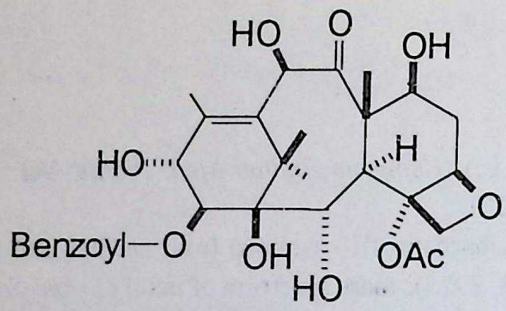

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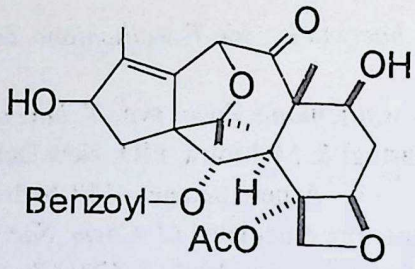

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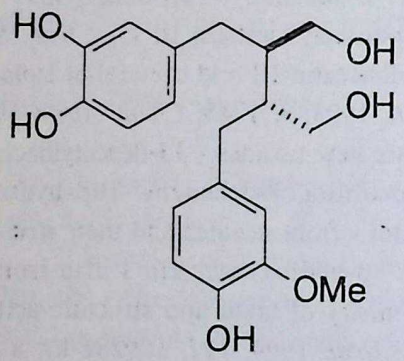
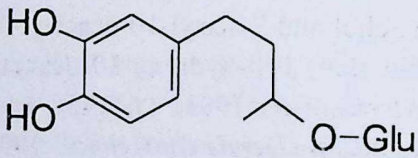
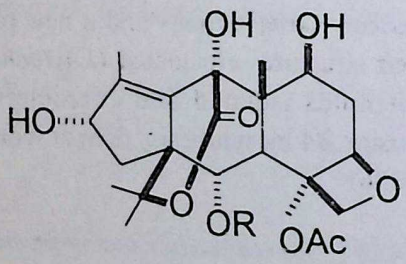


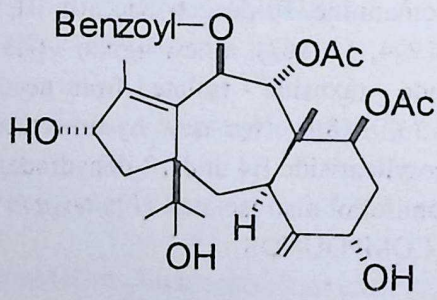
3-Demethyl-(-)secoisolariciresinol



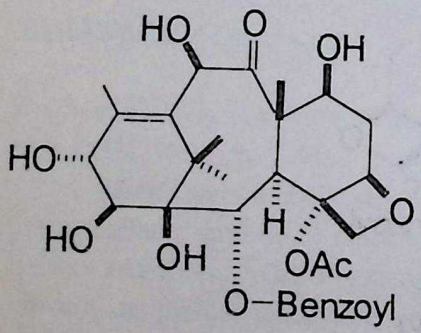
Taxuside



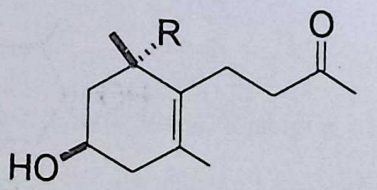
Wallifoliol
R = Benzoyl



Brevifoliol



14β-Hydroxy-10-deacetylbaccatin III



Deglycosylicariside B4
R = CH_2OH
12-Dehydrodeglycosylicariside B4
R = CHO

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BIOLOGICAL ACTIVITY

Taxol treatment of murine macrophage cell line (J774.1) increased mitochondrial dehydrogenase activity and [3H]thymidine incorporation. It also induced TNF-α secretion but was a week inducer of interleukins IL-1 and IL-2 (*Immunopharmacol. Immunotoxicol.* 1992, *14,* 39; *Chem. Abstr.* 1992, *116,* 227819 m); under endotoxin-free conditions, taxol did not induced IL-1-β or TNF-α production by human mononuclear cells or alveolar macrophages but in presence of endotoxin (1.0 pg to 1.0 μg.ml), it enhanced production of IL-1β by 50.0-100.0% and TNF-α by 25.0.50.0% (*J. Lab. Clin. Med.* 1993, *122,* 374; *Chem. Abstr.* 1994, *121,* 148553 v); taxol (1.0 μM) in cultures of human erythrocytes infected with *Plasmodium falciparum* prevented establishment of new infections. In mice infected with *P. chabaudi-adami,* taxol (975.0 μg/mouse, i.p.) eliminated blood parasitemia. This potent antimalarial activity of taxol at doses that are tolerated by humans, establishes its potential utility for treatment of severe drug-resistant human malaria (*J. Clin. Invest.* 1994, *94,* 413; *Chem. Abstr.* 1994, *121,* 124674 j); taxol reduced survival of rat pheochromocytoma cell line (PC12) in concentration-dependent manner; at 50.0 nM concentration survival was reduced to about 70.0% after 4 hr exposure. But it could antagonise calcium ionophore-induced cell death, increasing survival about 2.75-fold (*Life Sci.* 1994, *55,* 313).

TECOMA (Bignoniaceae)

T. argentea Britt.

Kaempferol, quercetin, luteolin, cyanidin-3-rutinoside, lycopene, capsanthin, β-carotene and zeaxanthin isolated (*Fitoterapia* 1992, *63,* 273).
Distribution: Introduced into Indian gardens.

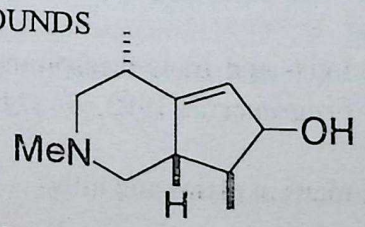
T. grandiflora (Thunb.) Loisel; see *Campsis grandiflora* (Thunb.) K. Schum.

T. pentaphylla Juss.; see *Tabebuia pentaphylla* (L.) Hemsl.

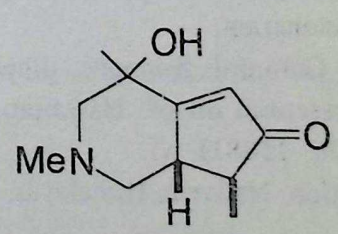
T. stans (L.) Juss. ex H.B. & K. syn. *Stenolobium stans* (L.) D.Don (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 711).

Two new alkaloids - 7-hydroxydehydroskytanthine and 4-hydroxytecomanine - isolated and their structures established; 5-hydroxyskytanthine and tecomanine also isolated (*Phytochemistry* 1993, *34,* 876); total synthesis of isooxyskytanthine (alkaloid C) (*J. Org. Chem.* 1993, *58,* 2351).

NEW COMPOUNDS



7-Hydroxydehydroskytanthine



4-Hydroxytecomanine

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TECTARIA (Aspidiaceae)

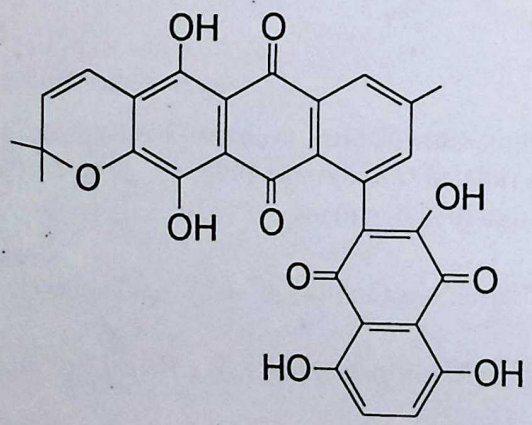
T. subtriphylla (Hook. & Arn.) Copel. syn. *Sagenia subtriphylla* Bedd.

Isolation and structure determination of two new phenolics - eriodictyol-8C-β-D-glucopyranoside and 6,7-dihydroxy-1,1-dimethylisochromane - from leaves along with gallic acid, ellagic acid, 2,3-hexahydroxydiphenoyl-D-glucose, (–)epicatechin, (–)epigallocatechin, (+)gallocatechin and 3,5-di-O-caffeoyl quinate (*Phytochemistry* 1993, *34,* 1625).
Distribution: South India.

TECTONA (Verbenaceae)

T. grandis L.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 712).

Linoleic acid (>53.0%) along with lauric, myristic, palmitic, stearic, oleic, linolenic and arachidic acids identified in seed oil (*Pakistan J. Sci. Ind. Res.* 1991, *34,* 359; *Chem. Abstr.* 1992, *116,* 231882 u); a new pigment - tectograndone - isolated from leaves and its structure established (*Phytochemistry* 1993, *33,* 933).
NEW COMPOUNDS



Tectograndone

TELOSMA (Asclepiadaceae)

T. cordata (Burm.f.) Merr. syn. *Pergularia minor* Andr., *Telosma minor* (Andr.) Craib

Eng. - Cowslip, East coast creeper, Primrose creeper; Beng. & Mar. - Kanjalata; Tel. - Seetamanoharam.

Geraniol, β-ionone, dihydro-β-ionone and cis- and trans-theaspiranes identified in flower essential oil of Hawaiian plant (*Flavour Fragrance J.* 1993, *8,* 221; *Chem. Abstr.* 1994, *120,* 158811 w).
Distribution: Native to Himalayas, now grown in gardens in plains and hills.

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T. minor (Andr.) Craib; see *T. cordata* (Brum.f.) Merr.

TEPHROSIA (Papilionaceae)

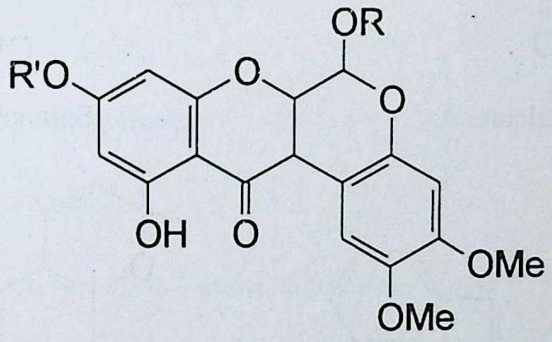
T. hamiltonii Drum. ex Gamble; see *T. purpurea* (L.) Pers.

T. pentaphylla (Roxb.) G.Don syn. *T. senticosa* sensu Hook.f. (non Pers.)

Three new oxygenated rotenoids - dihydrostemonal, 9-demethyldihydrostemonal and 6-acetoxydihydrostemonal - isolated and their structures determined; villosin, sumatrol, rotenone, cis-12-hydroxyrotenone, 6-hydroxyrotenone and α-toxicarol also isolated (*Phytochemistry* 1989, *28*, 3207); pods yielded robustigenin and villosol whereas 2-hydroxypterocarpin obtained from roots and stems (*Fitoterapia* 1992, *63*, 473).

Distribution: Karnataka.

NEW COMPOUNDS



Dihydrostemonal
R = H, R' = Me
9-Demethyldihydrostemonal
R,R' = H
6-Acetoxydihydrostemonal
R = Ac, R' = Me

T. purpurea (L.) Pers. syn. *T. hamiltonii* Drum. ex Gamble (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 716).

Hepatoprotective effect of aerial parts evaluated against (+)galactosamine-induced and carbon tetrachloride-induced hepatotoxicity in rats. An oral dose of powdered aerial parts (0.5 g/kg) to rats prevented elevation of SGOT, SGPT and bilirubin levels caused by galactosamine and CCl_4 (*Indian J. Pharmacol.* 1993, *25*, 34).

Isolation of O-methylpongamol, lanceolatin B, (+)purpurin and maackiain from dried roots (*Fitoterapia* 1992, *63*, 472).

T. senticosa Pers.; see *T. pentaphylla* (Roxb.) G.Don

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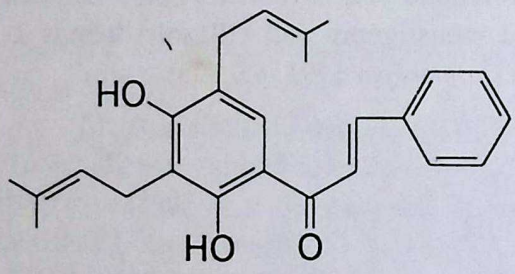
T. spinosa (L.f.) Pers.

Tel. - Mullavempali; Tam. - Mulkolinji; Kan. - Mullukoninji; Mal. - Mukkavala.

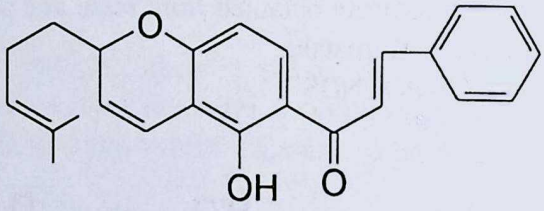
Two chalcones - spinochalcones A and B - isolated from roots and their structures elucidated; flemistrictin A also isolated (*Phytochemistry* 1992, *31*, 2121, 2915); isolation and structure determination of another chalcone - spinochalcone C - and two new flavanones - spinoflavanones A and B - from various parts of plant; fulvinervin A also obtained (*Phytochemistry* 1993, *32*, 183).

Distribution: South India, ascending to 400 m in hills.

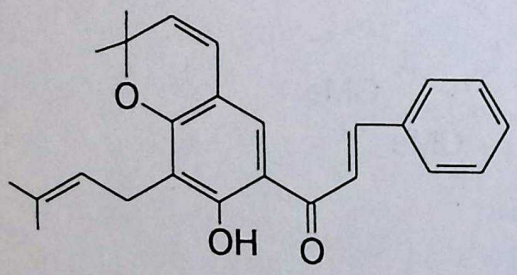
NEW COMPOUNDS



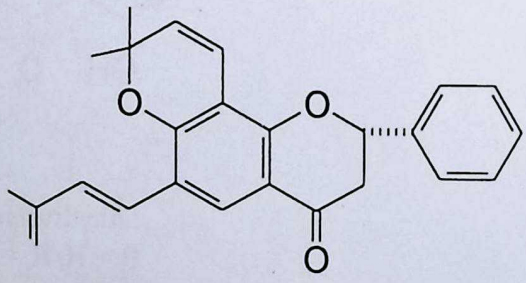
Spinochalcone A



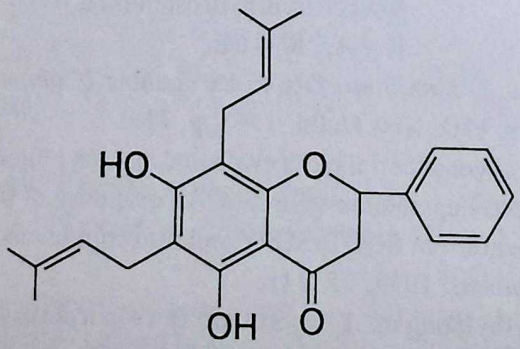
Spinochalcone B



Spinochalcone C



Spinoflavanone A



Spinoflavanone B

T. villosa (L.) Pers. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 632).

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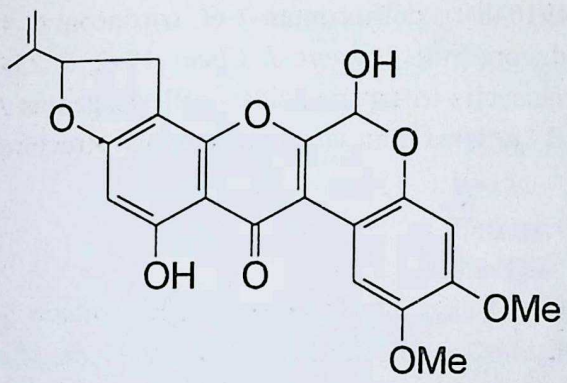
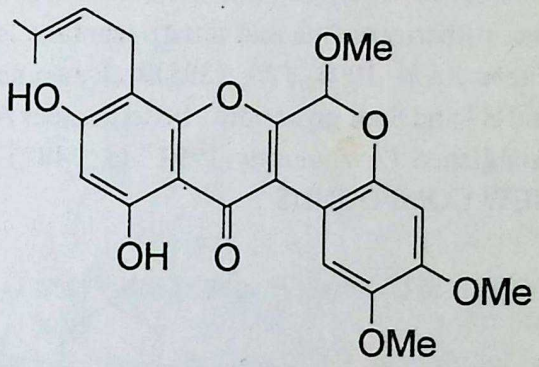
A new rotenoid - 12a-dehydro-6-hydroxysumatrol - isolated and its structure confirmed by partial synthesis; lupenone also isolated (*Phytochemistry* 1993, *32,* 484); a new prenylated dehydrorotenoid (I) isolated from seeds along with 12a-hydroxy-α-toxicarol and characterised as 12a-dehydro-2,3,6-trimethoxy-8-(3',3'-dimethylallyl)-9,11-dihydroxyrotenone (*J. Nat. Prod.* 1993, *56,* 765).

NEW COMPOUNDS



12a-Dehydro-6-hydroxysumatrol



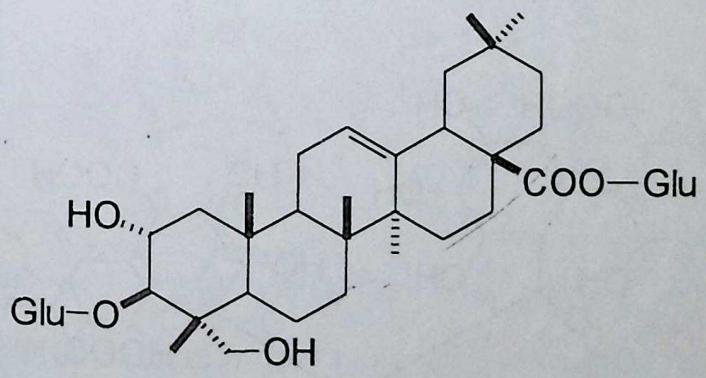
I

TERMINALIA (Combretaceae)

T. arjuna (Roxb.) Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 633).

A new triterpene glycoside - arjunolitin - isolated and its structure elucidated as 3-O-β-D-glucopyranosyl-2α,3β,23-trihydroxyolean-12-en-28-oic acid-28-O-β-D-glucoside (*Phytochemistry* 1992, *31,* 349).

NEW COMPOUNDS



Arjunolitin

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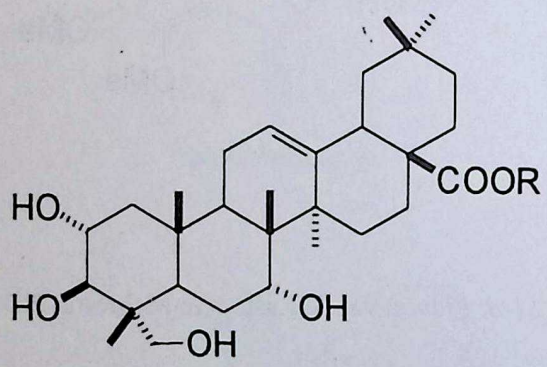
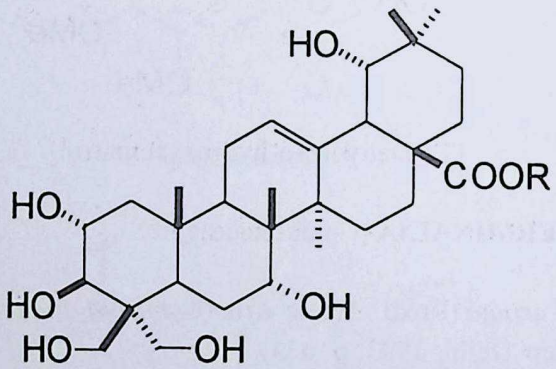
T. bellirica (Gaertn.) Roxb. (*belerica*) (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 671).

A new triterpene - belleric acid - along with its glucoside - bellericoside - isolated and their structures established; arjungenin and its glucoside also isolated (*Phytochemistry* 1989, *28,* 2769); isolation and crystal structure determination of tomentosic acid, obtained by acid hydrolysis of arjunglucoside I (*J. Chem. Soc.* Perkin 2 1990, 1445); isolation and structure elucidation of hexahydroxydiphenicyl heptahydroxydiphenicylate (I) from fruits (*Indian J. Nat. Prod.* 1991, *7*(1), 16; *Chem. Abstr.* 1992, *116,* 191048 t); dotriacontan-2-ol, tritriacontan-9-one, n-tritriacontane and tetratriacontane isolated from fruits (*Orient. J. Chem.* 1992, *8,* 255; *Chem. Abstr.* 1994, *120,* 129518 a); two new pentacyclic triterpene acids - bellericagenins A and B - and their glycosides - bellericasides A and B - isolated from stem bark and their structures established (*Tetrahedron* 1992, *48,* 2483).

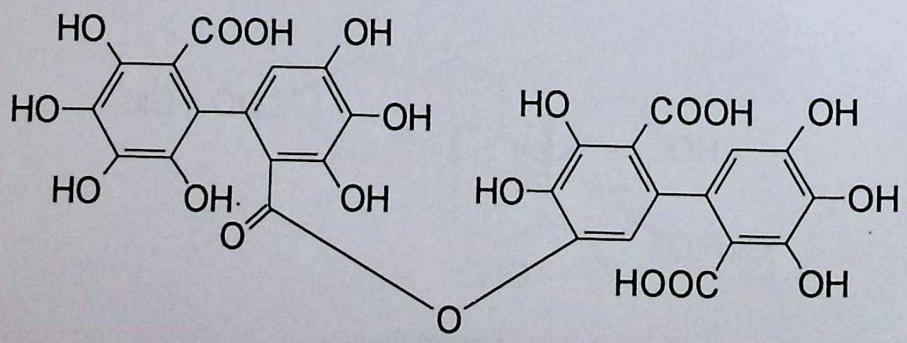
NEW COMPOUNDS



Bellericagenin A
R = H
Bellericaside A
R = Glu



Bellericagenin B
R = H
Bellericaside B
R = Glu



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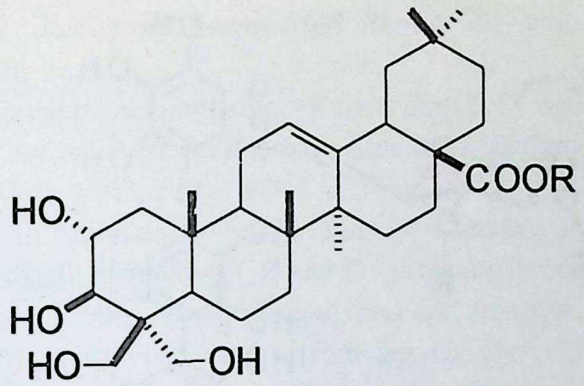
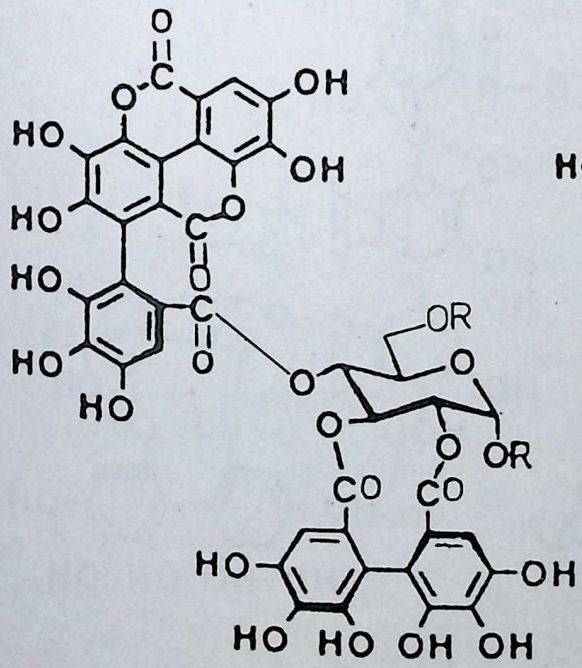


Belleric acid
R = H
Bellericoside
R = Glu

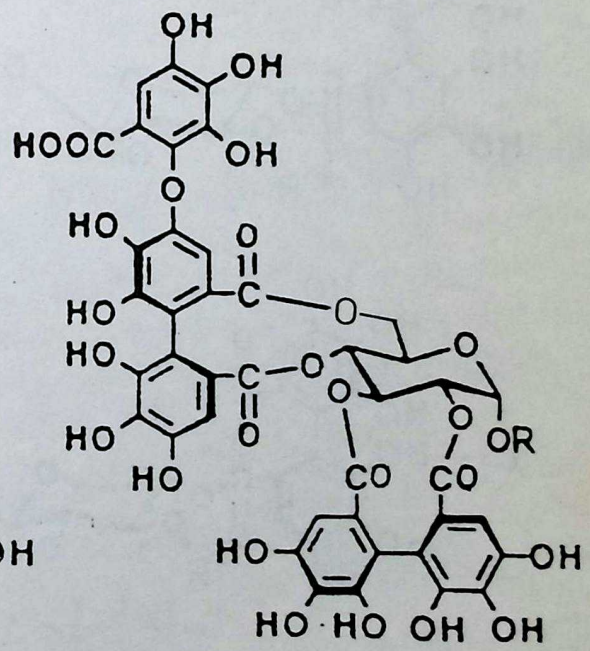
T. calamansanai (Blanco) Rolfe syn. *T. pyrifolia* (Presl) Kurz (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 242).

Isolation and structure determination of four new ellagitannins - calamansanin, calamanin A, calamanin B and calamanin C - from leaves (*Chem. Pharm. Bull.* 1991, *39,* 60).

NEW COMPOUNDS



Calamansanin
R = Galloyl



Calamanin A
R = Galloyl

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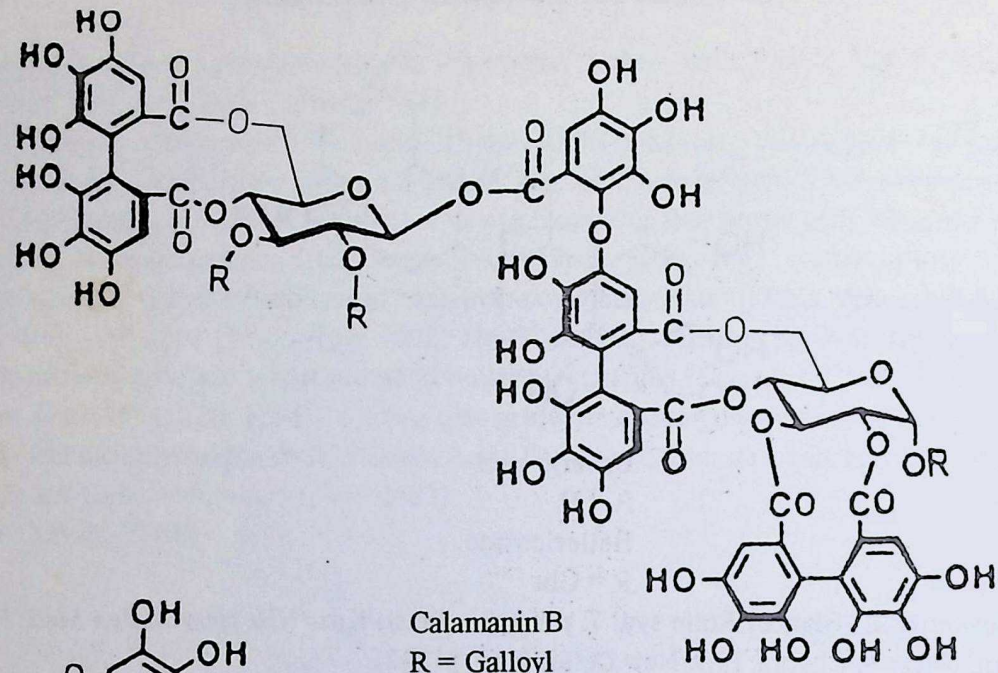
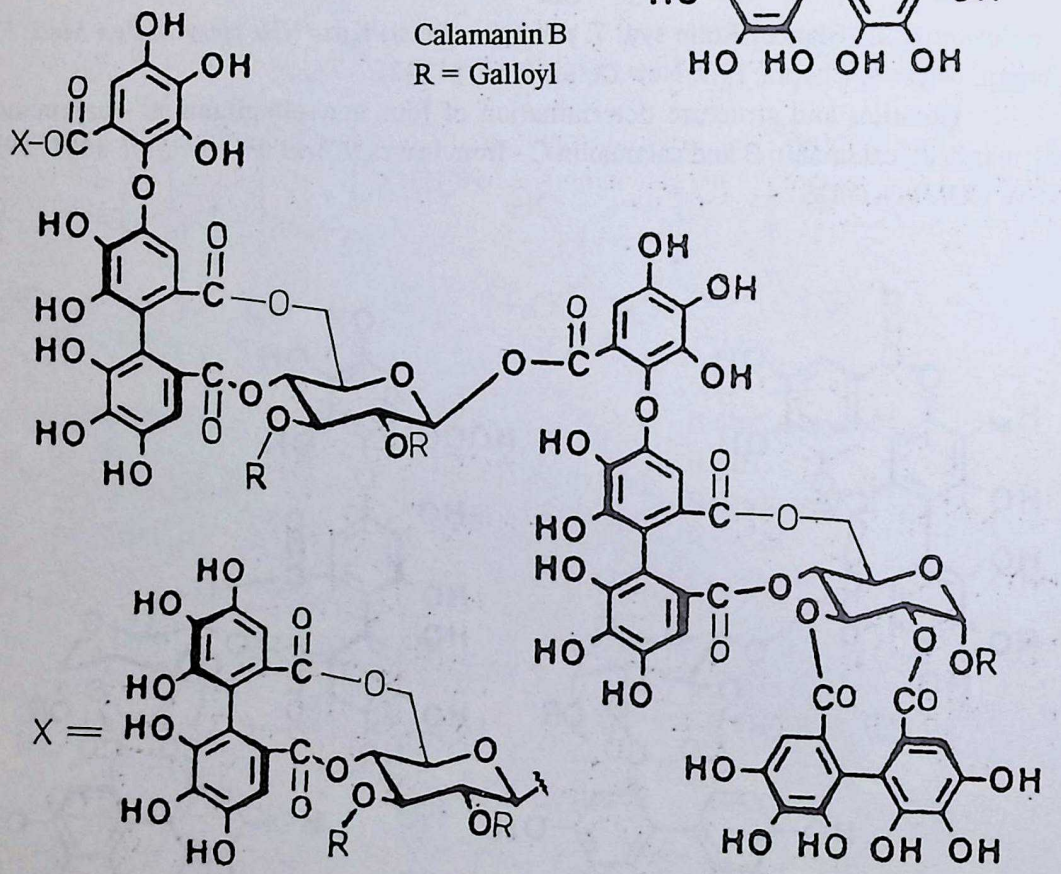


Calamanin B
R = Galloyl



Calamamin C
R = Galloyl

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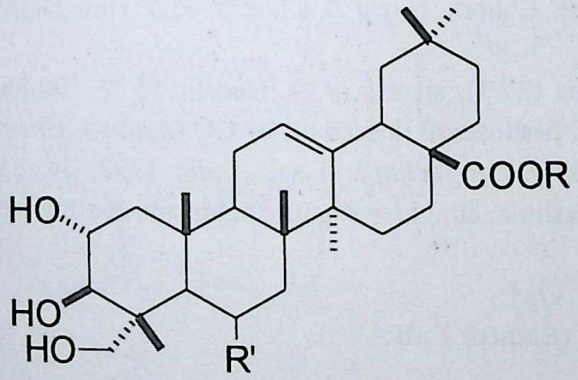
T. chebula (Gaertn.) Retz. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 719).

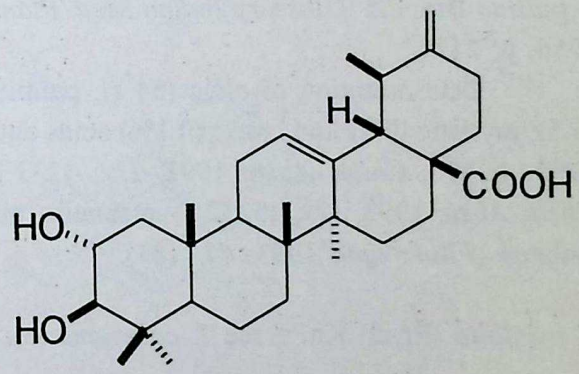
Ether extract showed higher antioxidant activity than BHA and BHT. Acid esters present in phenolic fraction of extract were found most effective (*Han'guk Nonghwa Hakhoe Chi* 1993, *36,* 203; *Chem. Abstr.* 1993, *119,* 269367 e).

A new ellagitannin - terchebulin - isolated from fruits along with punicalagin and terflavin A and its structure elucidated; terflavins B, C and D, punicalagin and punicalin isolated from leaves (*Chem. Pharm. Bull.* 1990, *38,* 3004); isolation and structure determination of a new triterpene - 2α-hydroxymicromeric acid - from leaves; in addition maslinic and 2α-hydroxyursolic acids isolated (*Phytochemistry* 1990, *29,* 2348); isolation of shikimic, gallic, triacontanoic and palmitic acids, β-sitosterol, daucosterol, triethyl ester of chebulic acid and ethyl ester of gallic acid from fruits (*Shanghai Yike Daxue Xuebao* 1991, *18,* 233; *Chem. Abstr.* 1992, *116,* 55517 t); a new triterpene - chebupentol - isolated from fruits and its structure determined; arjungenin, terminoic acid and arjunolic acid also isolated (*Zhiwu Xuebao* 1992, *34,* 126; *Chem. Abstr.* 1992, *117,* 108120 n); antioxidant constituents of plant, phloroglucinol and pyrogallol, isolated along with ferulic, vanillic, p-coumaric and caffeic acids (*Han'guk Nonghwa Hakhoe Chi* 1993, *36,* 239; *Chem. Abstr.* 1994, *120,* 50146 u); isolation of two new triterpenoid glycosides - chebuloside I and chebuloside II - from stem bark and their structure determination (*Phytochemistry* 1993, *32,* 999).

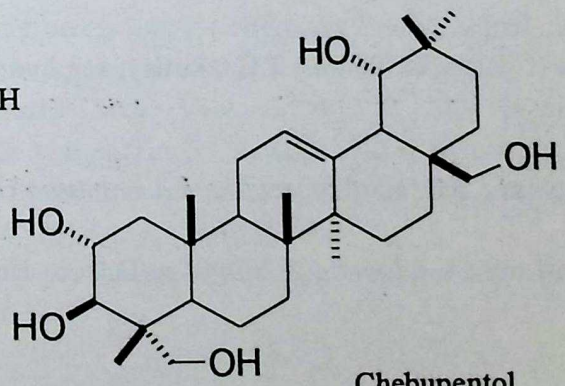
NEW COMPOUNDS



Chebuloside I
R = Gal, R' = H
Chebuloside II
R = Glu, R' = OH



2α-Hydroxymicromeric acid



Chebupentol

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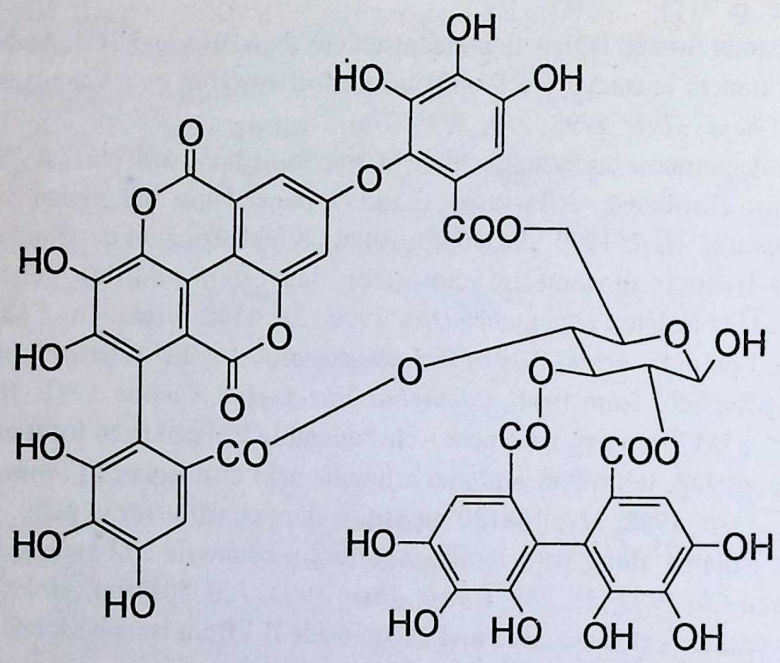

Terchebulin

T. pallida Brandis (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 242).

Determination of oleic (54.1), palmitic (27.3), stearic (9.2), isocetic (5.5), linoleic (3.5), myristic (0.2) and lauric (0.1%) acids and β-sitosterol in seed oil by GC (*Asian J. Chem.* 1992, *4,* 400; *Chem. Abstr.* 1992, *117,* 4233 k; *J. Oil Technol. Assoc. India* 1992, *24,* 81; *Chem. Abstr.* 1993, *119,* 45252 a); oleanolic, maslinic, ellagic and gallic acids and β-sitosterol isolated (*Fitoterapia* 1993, *64,* 183).

T. pyrifolia (Presl) Kurz; see *T. calamansanai* (Blanco) Rolfe

TETRADIUM (Rutaceae)

T. glabrifolium (Champ. ex Benth.) T.G. Hartley; see *Euodia glabrifolia* (Champ. ex Benth.) Balak.

T. ruticarpum (Juss.) T.G. Hartley; see *Euodia ruticarpa* (Juss.) Benth.

T. trichotomum Lour.; see *Euodia fraxinifolia* (D.Don) Hook.f.

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TETRAGONIA (Tetragoniaceae)

T. expansa Murr.; see *T. tetragonioides* (Pall.) O.Ktze.

T. tetragonioides (Pall.) O.Ktze. syn. *T. expansa* Murr. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 719).

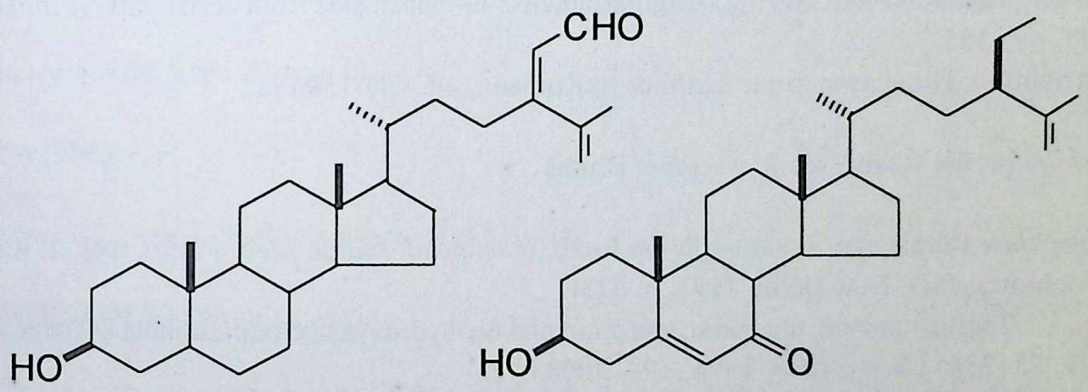
Cerebroside synthesised (*J. Carbohydr. Chem.* 1989, *8,* 199; *Chem. Abstr.* 1990, *112,* 56456 b).

TEUCRIUM (Lamiaceae)

T. chamaedrys L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 720).

Two new steroidal compounds - 3β-hydroxystigmast-24(28),25-dien-29-al (I) and 3β-hydroxy-24α-ethylcholesta-5,25-dien-7-one (II) - isolated from aerial parts and their structures determined; 24α-ethylcholesta-5,25-dien-3β-ol, sitosterol, α-amyrin, ursolic acid, apigenin, naringenin, pectolinaringenin and circiliol (*Phytochemistry* 1994, *36,* 171).

NEW COMPOUNDS



I II

T. quadrifarium Buch.-Ham. ex D. Don

A new flavone - 6,2'-dimethoxy-5,4',5'-trihydroxyflavone - isolated along with neolinarin, acacetin and apigenin (*Zhongguo Yaoke Daxue Xuebao* 1990, *21,* 376; *Chem. Abstr.* 1991, *114,* 203515 s; *Zhongguo Yaoke Daxue Xuebao* 1991, *22,* 200; *Chem. Abstr.* 1992, *116,* 170085 n); a new diterpenoid - teuquadrin B - isolated and its structure determined; in addition teucvidin, 12-epiteucvidin, teuflin, 19-acetylteuspinin and teucvin isolated (*Yaoxue Xuebao* 1993, *28,* 679; *Chem. Abstr.* 1994, *120,* 101920 b).

Distribution: Himalayas,from Kashmir to Sikkim and Meghalaya, alt. 1200-2400 m.

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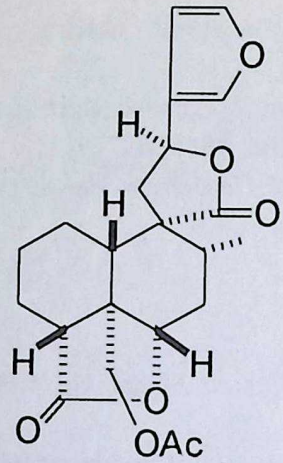

Teuquadrin B

T. royleanum Wall. ex Benth.

Isolation of hentriacontadien-1-ol, octadecanoic acid, octadecadienoic acid, hexacosanoic acid, 7,12-nonadecadien-9-one, lupeol, β-amyrin, 5,22,25-stigmastatrien-3-ol, 5,25-stigmastadien-3-ol and 5,23-stigmastadien-3-O-galactoside from aerial parts (*Fitoterapia* 1993, *64,* 555).

Distribution: Himalayas, from Kashmir to Kumaon, alt. 900-1500 m.

T. stoloniferum Roxb.; see *T. viscidum* Blume

T. viscidum Blume syn. *T. stoloniferum* Roxb. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 673).

Teuflin, teucvin, teucvidin, teuspinin and 6α-hydroxyteuscrodin isolated (*Zhongcaoyao* 1994, *25,* 234; *Chem. Abstr.* 1994, *121,* 200859 r).

THALICTRUM (Ranunculaceae)

T. foetidum L. syn. *T. minus* L. var. *foetidum* (L.) Hook.f. & Thoms. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 673).

Thalmelatine, thalictrogamine, thalipine and argemonine isolated from aerial parts whereas thalidasine, thalrugosamine, thaligosinine, berberine and magnoflorine obtained from underground parts (*Planta Med.* 1990, *56,* 337).

T. minus L. syn. *T. thunbergii* DC. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 642).

Two new cycloartane glycosides - thalictosides A and C - isolated from aerial parts and

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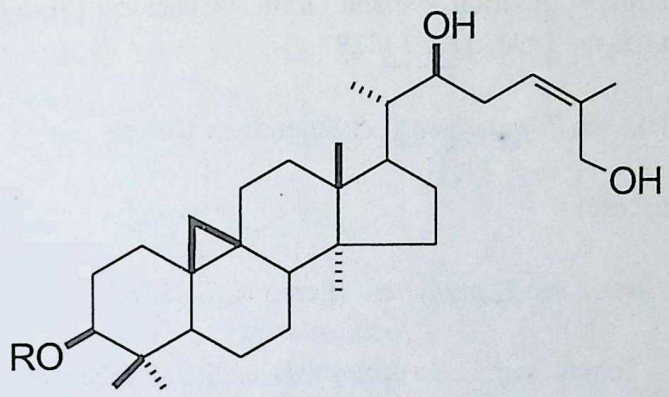
characterised as 3-O-β-D-quinovosyl(1→6)-β-D-glucosyl(1→4)-β-D-fucosylthalictogenin and 3-O-β-D-glucosyl(1→6)[α-L-rhamnosyl(1→2)]-β-D-glucosyl(1→4)-β-D-fucosylthalictogenin respectively (*Chem. Pharm. Bull.* 1992, *40,* 2465).

NEW COMPOUNDS



Thalictoside A
R = Fuc(4→1)Glu(6→1)Quinovose
Thalictoside C
R = Fuc(4→1)Glu[(2→1)Rha](6→1)Glu

T. minus L. var. *foetidum* (L.) Hook.f. & Thoms.; see *T. foetidum* L.

T. thunbergii DC.; see *T. minus* L.

THEA (Theaceae)

T. sinensis L.; see *Camellia sinensis* (L.) Kuntze

THEOBROMA (Sterculiaceae)

T. cacao L. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 676).

Three new procyanidins isolated from seeds and characterised as epicatechin(2β→5,4β→6)-epicatechin, 3-O-β-D-galactosylentepicatechin(2α→7,4α→8)-epicatechin and 3-O-L-arabinosylentepicatechin(2α→7,4α→8)-epicatechin (*Phytochemistry* 1991, *30,* 1657).

THESPESIA (Malvaceae)

T. populnea (L.) Soland. ex Correa syn. *T. populneoides* Kostel. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 726).

Lupenone, lupeol, β-sitosterol, alkanes (C19-33) and esters (C40-52) isolated (*Acta Cienc. Indica Chem.* 1989, *15,* 117; *Chem. Abstr.* 1990, *112,* 155297 g).

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BIOLOGICAL ACTIVITY

Lupenone, lupeol, β-sitosterol, alkanes (C19-33) and esters (C40-52) were evaluated against *Staphylococcus aureus, S. albus, Bacillus subtilis, Escherichia coli, Klebsiella, Shigella dysenteriae, Proteus vulgaris* and *Pseudomonas pyocyanee in vitro*. Alkanes, lupenone and lupeol were active against both Gram +ve and Gram -ve bacteria (*Acta Cienc. Indica, Chem.* 1989, *15,* 117; *Chem. Abstr.* 1990, *112,* 155297 g).

T. populneoides Kostel.; see *T. populnea* (L.) Soland. ex Correa

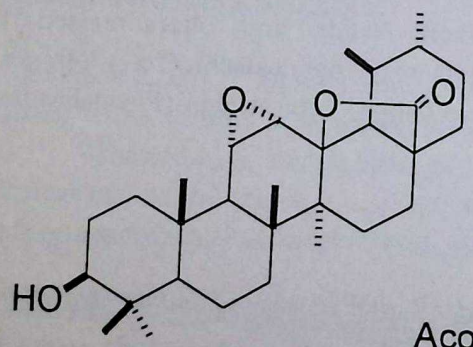
THEVETIA (Apocynaceae)

T. neriifolia Juss. ex Steud.; see *T. peruviana* (Pers.) K. Schum.

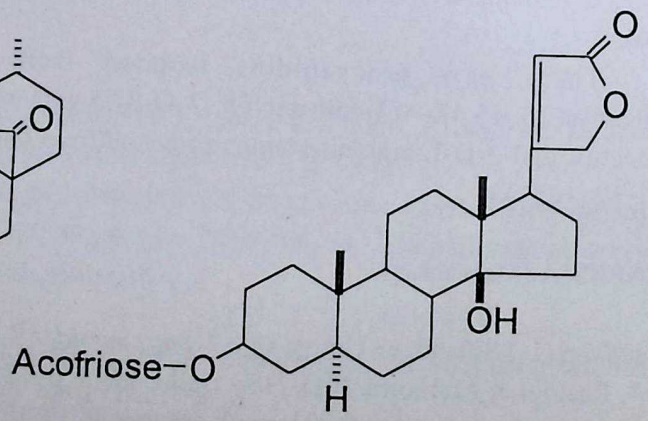
T. peruviana (Pers.) K. Schum. syn. *T. neriifolia* Juss. ex Steud. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 727).

Isolation of lupeol, α- and β-amyrins, taraxasterol and ψ-taraxasterol from roots (*J. Indian Chem. Soc.* 1990, *67,* 88); glutamic acid, aspartic acid, leucine, glycine, isoleucine, arginine, valine, alanine, proline, phenylalanine, cystine, lysine, serine, tyrosine, histidine, threonine, methionine and tryptophan isolated from leaves (*Asian J. Chem.* 1991, *3,* 304; *Chem. Abstr.* 1992, *116,* 190982 f); isolation and structure elucidation of C-nor-D-homocardenolide glycosides - thevetiosides A, B, C, D, E, F and G - from airdried leaves; digitoxigenin α-L-thevetoside and digitoxigenin α-L-acofrioside also isolated (*Phytochemistry* 1992, *31,* 251); a new cardenolide - neriifoside - isolated from leaves and characterised as 3β-O-α-L-acofriosyl-14β-hydroxy-5α-carda-20:22-enolide; peruvoside, lupeol acetate, oleanolic acid, ursolic acid, α-amyrin acetate, β-amyrin acetate and 4,16-pregnadien-12β-hydroxy-3,20-dione also isolated (*Phytochemistry* 1992, *31,* 3541); isolation of a new pentacyclic triterpene (I) from leaves and its characterisation as 3β-hydroxy-11α,12α-epoxy-urs-13β,28-olide; in addition, 3β-O-α-L-thevetose-3β,14β-dihydroxy-14(13→12)-abeo-5β,12β,14β-carda-13(18),20(22)-dienolide isolated (*J. Nat. Prod.* 1993, *56,* 613).

NEW COMPOUNDS



I



Neriifoside

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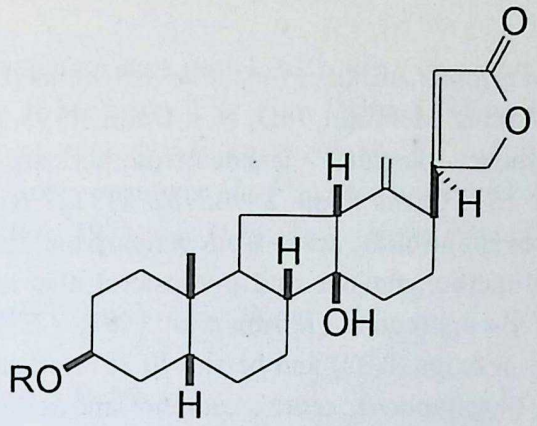

Thevetioside A
R = Thevetose
Thevetioside B
R = Acofriose
Thevetioside C
R = Thevetose(4→1)Glu
Thevetioside D
R = Acofriose(4→1)Glu
Thevetioside E
R = Thevetose(2-Ac)(4→1)Glu
Thevetioside F
R = Thevetose(4→1)Gentiobiose
Thevetioside G
R = Thevetose(2-Ac)(4→1)Gentiobiose

THRYALLIS (Malpighiaceae)

T. glauca O.Kuntze syn. *Galphimia glauca* Cav.

Methanolic extract showed significant sedative and anticonvulsant activities (*Planta Med.* 1992, *58,* 234).

Tetragalloylquinic acid, gallic acid, its methyl ester and quercetin isolated (Ger. 106,026 (1992) Aug. 27; *Chem. Abstr.* 1993, *118,* 109682 e); galphimine B isolated from aerial parts (*Planta Med.* 1993, *59,* 398).

Distribution: Native of Mexico, introduced into Indian gardens.

BIOLOGICAL ACTIVITY

Tetragalloylquinic acid (5.0 mg/kg) showed antiallergic activity (Ger. 4,106,026 (1992) Aug. 27; *Chem. Abstr.* 1993, *118,* 109682 e); galphimine B exhibited strong CNS-depressant activity but no significant anticonvulsant activity (*Planta Med.* 1993, *59,* 398).

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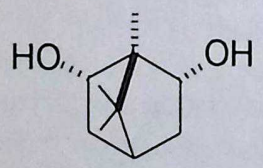
THUJA (Cupressaceae)

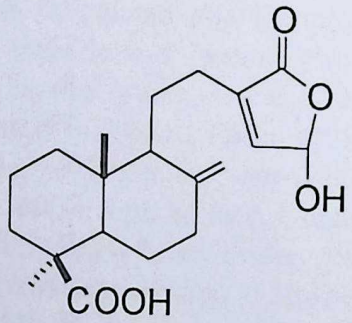
T. orientalis L. syn. *Biota orientalis* Endl., *Platycladus orientalis* (L.) Franco (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 728).

A new monoterpene - platydiol - isolated from pericarp and its structrue elucidated (*Chem. Express* 1989, *4,* 511; *Chem. Abstr.* 1990, *112,* 119127 t); isolation of a new labdane-type diterpene - 15-hydroxypinusolidic acid - from pericarp and its structure determination; α-cedrol, 5-hydroxy-7,4'-dimethoxyflavone and β-sitosterol also isolated (*Heterocycles* 1990, *31,* 1705); synthesis of β-cuparenone (*Tetrahedron* 1991, *47,* 481; *ibid.* 1992, *48,* 3429); essential oil obtained from twigs (0.32) and berries (0.25%) containes as major constituents, α-thujene, (+)sabinene, (+)camphene, cedrol, cedrenol and α- and β-pinenes (*Mansoura J. Pharm. Sci.* 1992, *8,* 37; *Chem. Abstr.* 1992, *117,* 257942 j); isolation of pimaric and isopimaric acids from leaves (*Fitoterapia* 1993, *64,* 476); C16 to C24 fatty acids identified in seed oil (17.2%) (*Pakistan J. Sci. Ind. Res.* 1993, *36,* 82; *Chem. Abstr.* 1994, *120,* 102021 w).

NEW COMPOUNDS



Platydiol



15-Hydroxypinusolidic acid

THUNBERGIA (Acanthaceae)

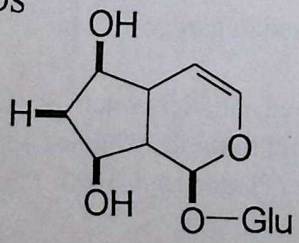
T. alata Bojer ex Sims.

Eng. - Black-eyed susan.

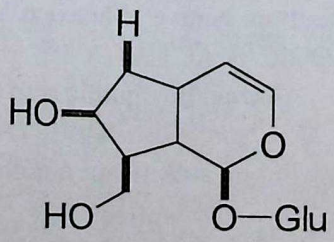
Two new iridoid glucosides - alatoside and thunaloside - isolated from leaves and their structures established; stilbericoside, 6-epistilbericoside and thunbergioside also isolated (*Phytochemistry* 1994, *35,* 1259).

Distribution : Native of Africa, introduced into Indian gardens, now naturalised in Assam and North Bengal.

NEW COMPOUNDS



Alastoside



Thunaloside

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THYMUS (Lamiaceae)

T. linearis Benth. syn. *T. serphyllum* auct. (non L.), *T. quinquecostatus* Celak (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 729).

Thymol (42.63), p-cymene (9.54), carvacrol (8.16), camphor (3.54), terpinen-1-ol (2.90), caryophyllene (2.19) and γ-terpinene (1.66%) determined in essential oil from Pakistani plant (*Pakistan J. Sci. Ind. Res.* 1991, *34,* 119; *Chem. Abstr.* 1992, *116,* 113305 k).

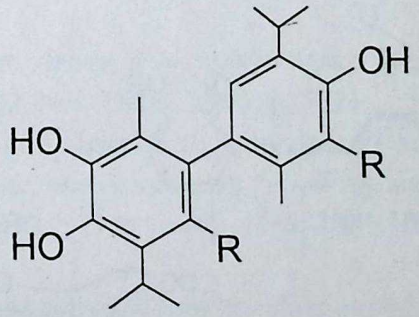
T. quinquecostatus Celak; see *T. linearis* Benth.

T. serphyllum L.; see *T. linearis* Benth.

T. vulgaris L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 729).

5,4'-Dihydroxy-6,7,8-trimethoxyflavone, 5,4'-dihydroxy-6,7,3'-trimethoxyflavone, 5,4'-dihydroxy-7-methoxyflavone, 5-hydroxy-7,4'-dimethoxyflavone, 5,4'-dihydroxy-6,7,8,3'-tetramethoxyflavone and 5,4'-dihydroxy-6,7-dimethoxyflavone isolated (*Agric. Biol. Chem.* 1989, *53,* 3043); hydroxybiphenyl compounds (I) isolated (Jpn. 2,160,737 (1990) Jun. 20; *Chem. Abstr.* 1991, *114,* 3674 f); thymol (24.48 - 56.53) and carvacrol (1.75 - 2.70%) determined by HPLC in essential oil of plant grown in Vojvodina and Slavonija (*Zb. Matice Srp. Prir. Nauke* 1991, *80,* 17; *Chem. Abstr.* 1993, *118,* 211486 f).

NEW COMPOUNDS



I

R = H/OH

BIOLOGICAL ACTIVITY

Antioxidant activities of 5,4'-dihydroxy-6,7,3'-trimethoxyflavone, 5,4'-dihydroxy-7-methoxyflavone and 5,4'-dihydroxy-6,7,8,3'-tetramethoxyflavone were greater than that of α-tocopherol and similar to that of BHT (*Agric. Biol. Chem.* 1989, *53,* 3043).

TIBOUCHINA (Melastomataceae)

T. semidecandra Cogn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 730).

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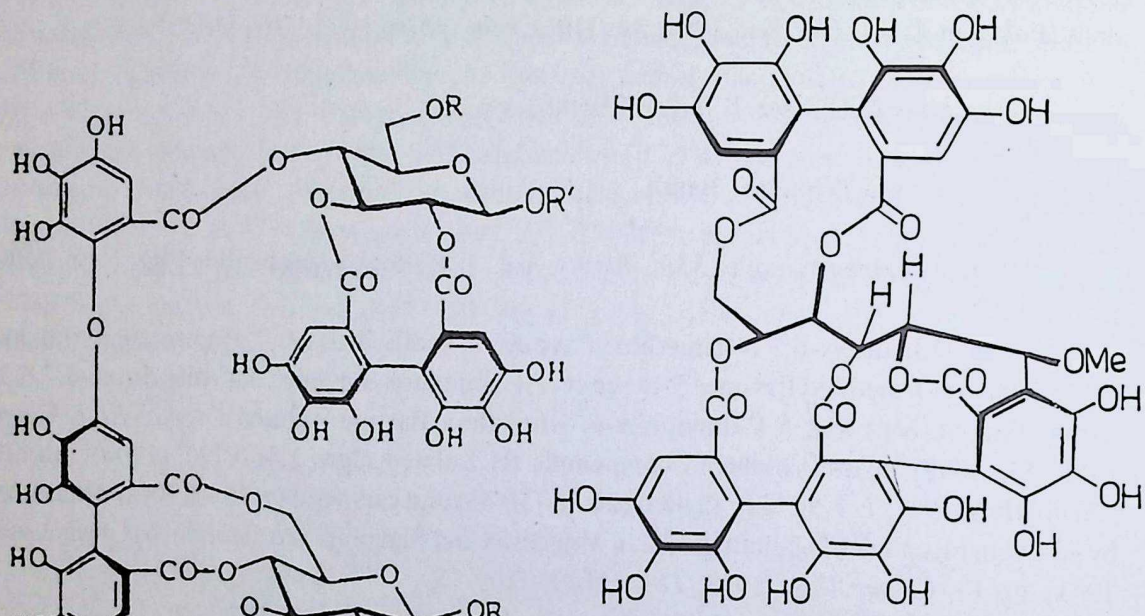
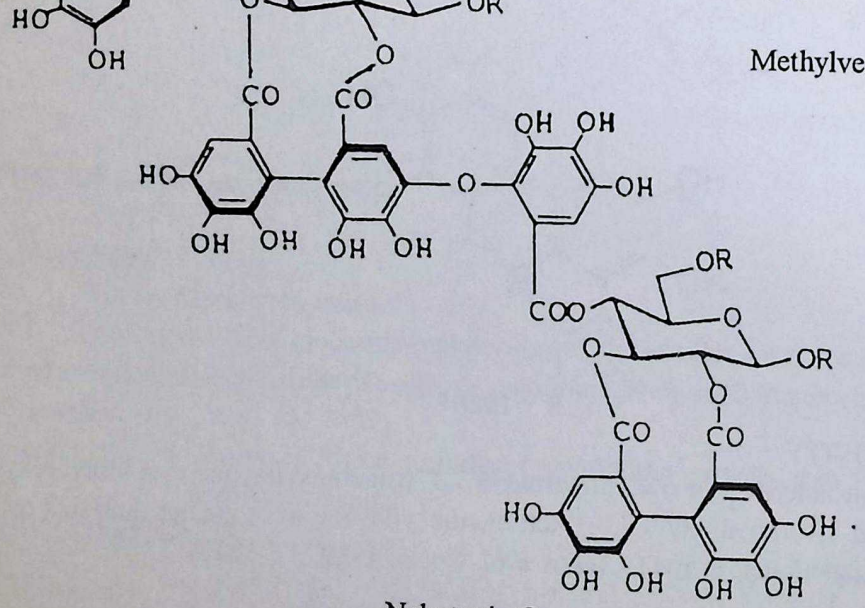
A new hydrolysable tannin - methylvescalagin - isolated from leaves and its structure elucidated; nobotanins A, D and F also obtained (*Chem. Pharm. Bull.* 1991, *39*, 2233); isolation of two new tannin oligomers - nobotanins C and E - from leaves and their structure determination; nobotanin B also isolated (*Chem. Pharm. Bull.* 1991, *39*, 2264).

NEW COMPOUNDS



Methylvescalagin



Nobotanin C
R = Galloyl, R' = H
Nobotanin E
R = Galloyl, R' = Glu

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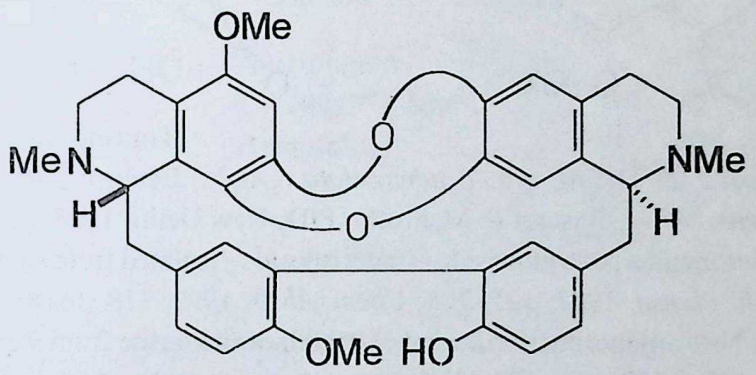
TILIACORA (Menispermaceae)

T. acuminata (Lamk.) Miers syn. *T. racemosa* Colebr. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 732).

A new diphenylbisbenzylisoquinoline alkaloid - tiliaresine - isolated and its structure established along with tiliacorine, tiliacorinine, 2'-nortiliacorinine, tiliarine, tiliamosine and N-methyl tiliamosine (*Phytochemistry* 1990, *29,* 1020); ^{13}C-NMR of tiliamosine, N-methyl tiliamosine and tiliaresine determined (*Phytochemistry* 1990, *29,* 1023).

NEW COMPOUNDS



Tiliaresin

T. racemosa Colebr.; see *T. acuminata* (Lamk.) Miers

T. triandra (Colebr.) Diels syn. *Aristega laevifolia* Miers (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 732).

Root extract showed antimalarial activity against *Plasmodium falciparum in vitro*.

Tiliacorine, tiliacorinine, nortiliacorinine A and two uncharacterised alkaloids G and H isolated (*Phytother. Res.* 1989, *3,* 215; *Chem. Abstr.* 1990, *112,* 15970 w).

BIOLOGICAL ACTIVITY

Alkaloid G was the most active *in vitro* as schizontocide (IC50 344.0 ng/ml), followed by nortiliacorinine A (IC50 558.0 ng/ml) and tiliacorine (IC50 675.0 ng/ml) (*Phytother. Res.* 1989, *3,* 215; *Chem. Abstr.* 1990, *112,* 15970 w).

TINOSPORA (Menispermaceae)

T. cordifolia (Willd.) Miers ex Hook.f. & Thoms (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 733).

A new furanoid diterpene glucoside (I) isolated from stems and its structure established (*Phytochemistry* 1989, *28,* 2419); isolation and crystal structure of tinosporide (*Acta Crystallogr., Cryst. Struct. Commun.* 1989, *45C,* 134; *Chem. Abstr.* 1990, *112,* 21162 a).

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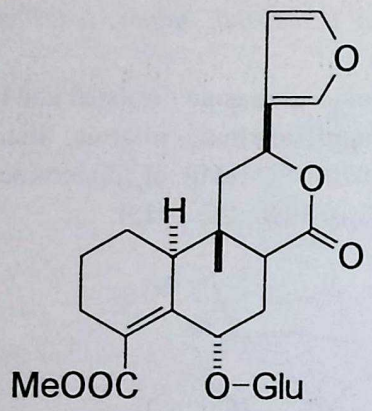
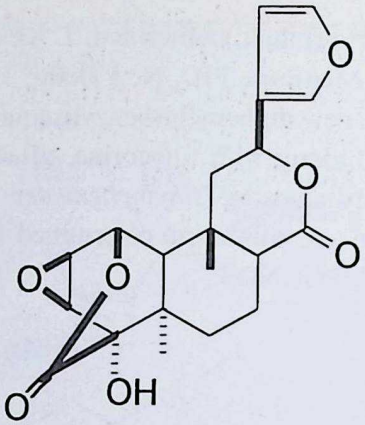


I

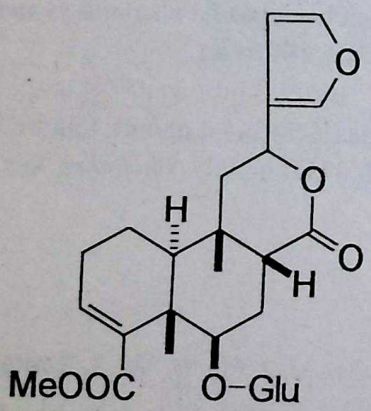


Tinosporide

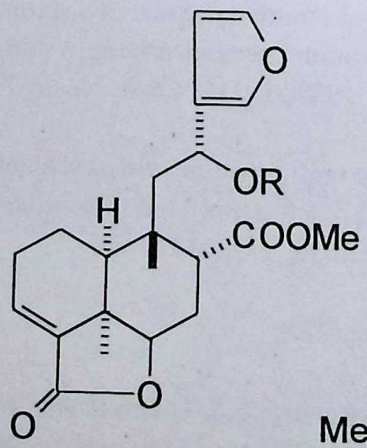
T. crispa (L.) Hook.f. & Thoms. syn. *T. tuberculata* (Lamk.) Beumee ex K.Heyne (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 735).

A new furanoditerpene glucoside - tinocrisposide - isolated from stems and its structure determined (*Arch. Pharm.* 1992, *325,* 705; *Chem. Abstr.* 1993, *118,* 56181 g); isolation of N-formylanonaine, N-formylnornuciferine and N-acetylnornuciferine from stems and their NMR assigned (*Planta Med.* 1992, *58,* 184); isolation and structure elucidation of two new furanoid diterpenes - tinotufolin A and tinotufolin B - from fresh leaves (*Ann. Chem.* 1993, 325); isolation of four new diterpenes -tinotufolins C, D, E and F - from fresh leaves and their structure elucidation (*Ann. Chem.* 1994, 755); another five new furanoid diterpenes - borapetosides C, D, E, F and G - isolated from stems and their structures determined (*Ann. Chem.* 1993, 491).

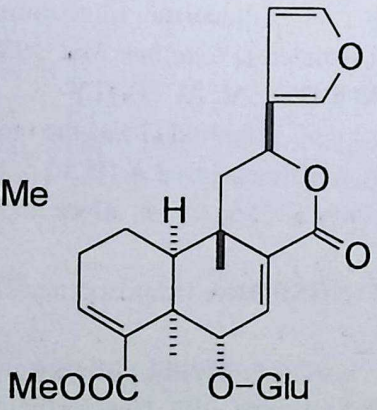
NEW COMPOUNDS



Borapetoside C



Borapetoside D
R = Glu(6→1)Glu
Borapetoside E
R = Glu



Borapetoside F

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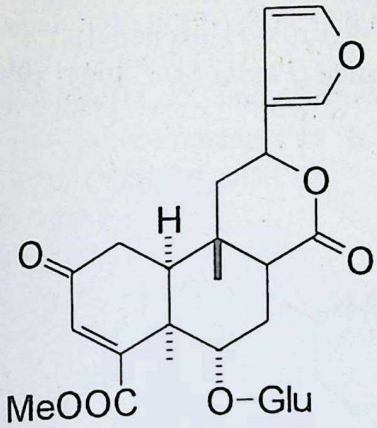
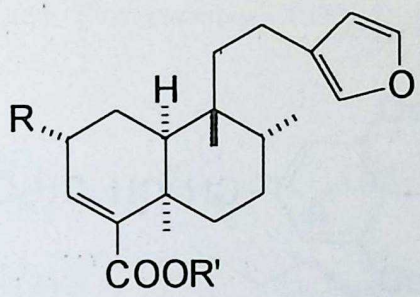
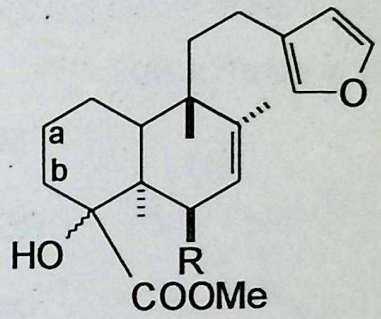


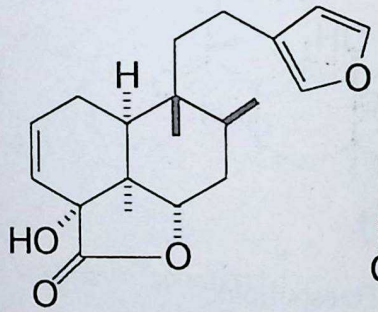
Borapetoside G



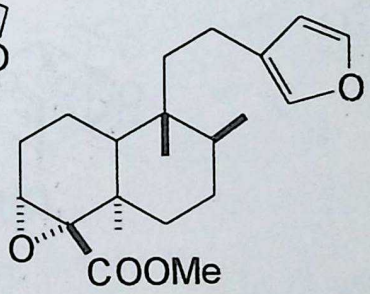
Tinotufolin A
R = OH, R' = Me
Tinotufolin B
R,R' = H



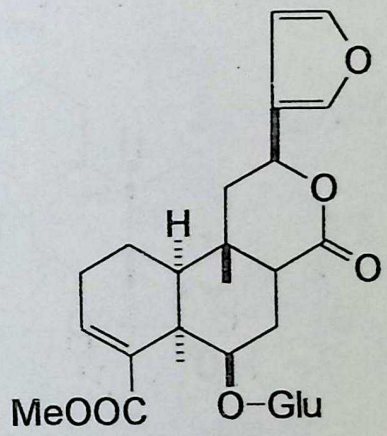
Tinotufolin C
R = OH, ~~ = β
Tinotufolin E
R = H, ~~ = α, ab =Δ



Tinotufolin D



Tinotufolin F



Tinocrisposide

T. malabarica (Lamk.) Hook.f. & Thoms.; see *T. sinensis* (Lour.) Merr.

T. sinensis (Lour.) Merr. syn. *T. malabarica* (Lamk.) Hook.f. & Thoms., *T. tomentosa* (Colebr.) Hook.f. & Thoms. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 735).

Isolation of magnoflorine, quercetin-3-O-glucoside, kaempferol and its 3-O-glucoside from stems (*Herba Hung.* 1989, *28,* 63; *Chem. Abstr.* 1990, *112,* 195238 v); a new diterpenoid - tinosporicide - isolated from fresh stems and its structure established (*Phytochemistry* 1991, *30,* 356); isolation and structure determination of a new furanoid diterpene - menispermacide - from stems, palmatine and cycloeuphordenol also isolated (*Phytochemistry* 1992, *31,* 3155); NMR studies on (+)malabarolide (*Adv. Nat. Prod. Chem., Proc. Int. Symp. Pak.-US Binatl.*

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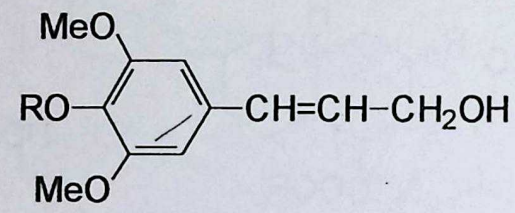
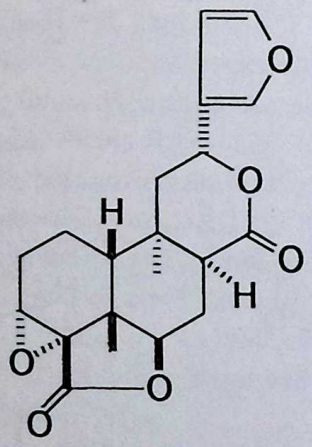
Workshop 5th 1992, 463; *Chem. Abstr.* 1994, *120,* 50128 q); a new phenolic glycoside - tinosinen I - isolated from fresh stems and characterised as (E)1-(3-hydroxy-1-propenyl)-3,5-dimethoxyphenyl-4-O-β-D-apiofuranosyl(1→3)-β-D-glucopyranoside (*Planta Med.* 1993, *59,* 552).

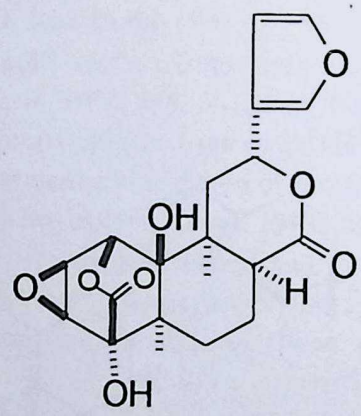
NEW COMPOUNDS



Tinosinen I
R = Glu(3→1)Apiose



Menispermacide



Tinosporicide

T. tomentosa (Colebr.) Hook.f. & Thoms.; see *T. sinensis* (Lour.) Merr.

T. tuberculata (Lamk.) Beumee ex K.Heyne; see *T. crispa* (L.) Hook.f. & Thoms.

TITHONIA (Asteraceae)

T. diversifolia A. Gray (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 736).

Monoterpenoides (88.2%) obtained from leaf essential oil of plant from Central Tropical Africa, consist of monoterpene hydrocarbons (87.4%) and monoterpene and sesquiterpene hydrocarbons (8.0%); (Z)β-ocimene (40.2%) found as major constituent (*J. Essent. Oil Res.* 1991, *3,* 399; *Chem. Abstr.* 1992, *116,* 37973 j); α-pinene (50.8, 61.0), (Z)β-ocimene (15.5, 21.4), limonene (5.4, 6.4) and p-mentha-1,5-dien-8-ol (3.9, 6.1%) determined

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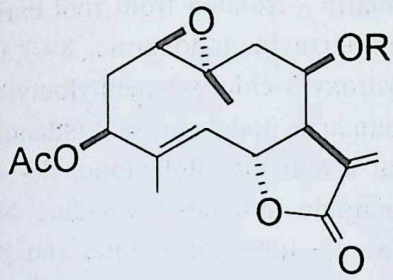
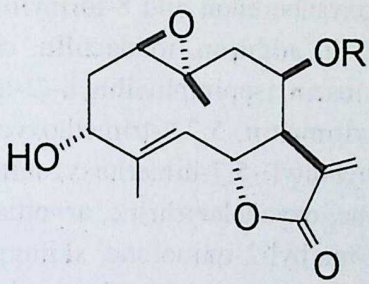
by GC-MS in two samples of flower essential oil from plants of Central Tropical Africa by GC-MS (*J. Essent. Oil Res.* 1992, *4*, 651; *Chem. Abstr.* 1993, *118*, 98076 g); nine new sesquiterpene lactones (I to IX) isolated from aerial parts and their structures elucidated; 6-acetyl-2,2-dimethyl-7-hydroxychromene also isolated (*Phytochemistry* 1992, *31*, 3139).

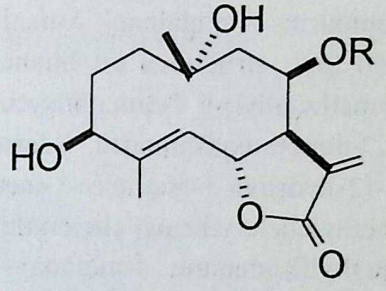
NEW COMPOUNDS



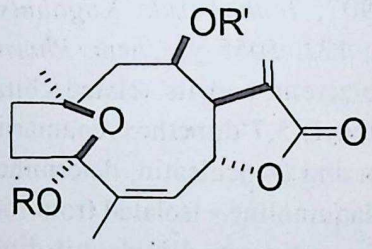
I
R = Isobutyryl



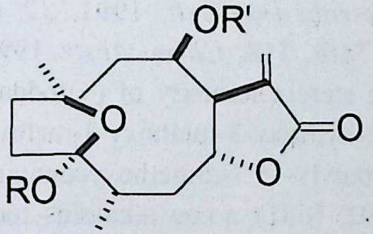
II
R = Isobutyryl



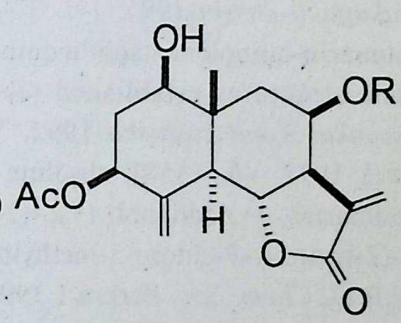
III
R = Isobutyryl



IV
R = H, R' = Isobutyryl
V
R = Me, R' = Isobutyryl



VI
R,R' = H
VII
R = H, R' = Isobutyryl
VIII
R = Me, R' = Isobutyryl



IX
R = Isobutyryl

BIOLOGICAL ACTIVITY

Tagitinin A, tagitinin C and hispidulin dettered in dose-dependent manner feeding by caterpillars of *Diacrisia obliqua, Phissama transiens, Trabala vishnu* and grubs of *Epilachna vigintioctopunctata* (*J. Environ. Biol.* 1993, *14*, 27; *Chem. Abstr.* 1993, *119*, 156217 n).

TODDALIA (Rutaceae)

T. aculeata Pers.; see *T. asiatica* (L.) Lam.

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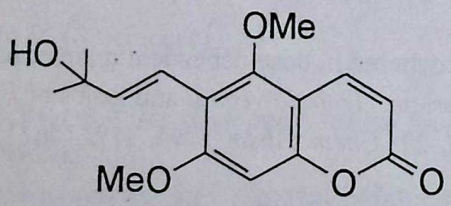
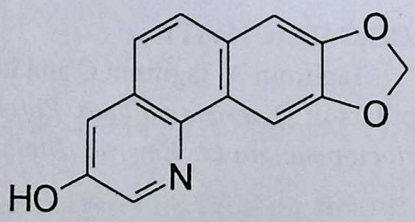
T. asiatica (L.) Lam. syn. *T. aculeata* Pers. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 648).

Aculeatin (3.4), toddalolactone (0.19) and coumarins (I) (0.04) and (II) (0.011%) isolated from roots (Jpn. 1,242,578 (1989) Sep. 27; *Chem. Abstr.* 1990, *112,* 204661 g); a new coumarin - toddalosin - isolated and its crystal structure determined (*Yakugaku Zasshi* 1991, *111,* 365; *Chem. Abstr.* 1992, *116,* 3546 g; *Chem. Pharm. Bull.* 1993, *41,* 1655); three new coumarins - toddalenol, 5-methoxysuberenon and 8-formyllimettin - isolated from root bark and their structures established; in addition, toddaculin, coumarrayin, toddanone, 8-(3,3-dimethylallyl)-6,7-dimethoxycoumarin, isopimpinellin, 6-(2-hydroxy-3-chloro-3-methylbutyl)-5,7-dimethoxycoumarin, 6-formyllimettin, 5,7,8-trimethoxycoumarin, toddasin, (+)toddanol, 6-(2-hydroxy-3-methoxy-3-methylbutyl)-5,7-dimethoxycoumarin and toddalolactone; de-N-methylchelerythrine, chelerythrine, oxychelerythrine, arnottianamide, avicine, oxyavicine, N-methylflindersine, 4-methoxy-1-methyl-2-quinolone, skimmianine, integriquinolone and β-amyrin isolated (*Yakugaku Zasshi* 1991, *111,* 365; *Chem. Abstr.* 1992, *116,* 3546 g); aculeatin was shown to be main component of plant by its supercritical fluid extraction and not toddalolactone which was previously isolated as main component by soxhlet extraction (*Yakugaku Zasshi* 1991, *111,* 376; *Chem. Abstr.* 1991, *115,* 252094 h); two mixed dimers of coumarin-quinolone naphthoquinones - toddacoumalone and toddacoumaquinone - isolated and their structures established (*Tetrahedron Lett.* 1991. *32,* 6907; *Tennen Yuki Kagobutsu Toronkai Koen Yoshishu* 1992, 34th, 518; *Chem. Abstr.* 1994, *121,* 5055 y; *Chem. Pharm. Bull.* 1992, *40,* 1358); absolute stereochemistry of (+)toddalolactone and its related chiral coumarins, (+)toddanol, (+)6-(2-hydroxy-3-methoxy-3-methylbutyl)-5,7-dimethoxycoumarin, 6-(2-hydroxy-3-chloro-3-methylbutyl)—5,7-dimethoxycoumarin and (–)aculeatin, determined as R (*J. Chem. Soc.* Perkin 1 1992, 1681); a new alkaloid - toddaquinoline - isolated from root bark and its structure determined; avicine, dihydroavicine, nitidine, dihydronitidine, norchelerythrine, skimmianine, isopimpinellin, toddanol, toddanone, toddalolactone, 5,7,8-trimethoxycoumarin and 6-(2-hydroxy-3-methoxy-3-methylbutyl)-5,7-dimethoxycoumarin also isolated (*Phytochemistry* 1993, *34,* 1449).

NEW COMPOUNDS



Toddalenol



Toddaquinoline

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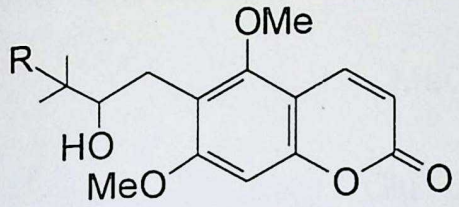
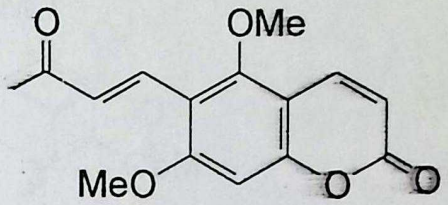
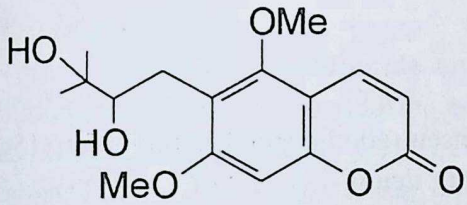


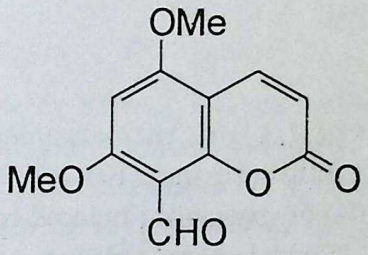
I
R = Cl
II
R = OMe



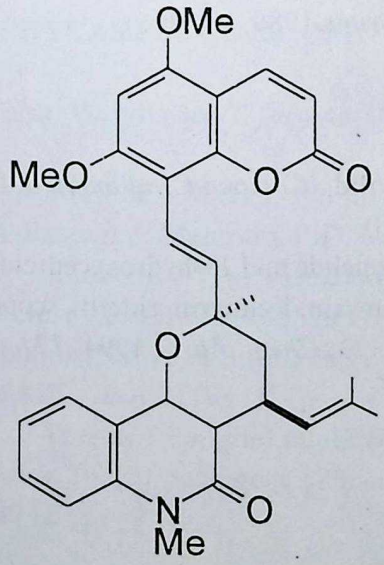
5-Methoxysuberenon



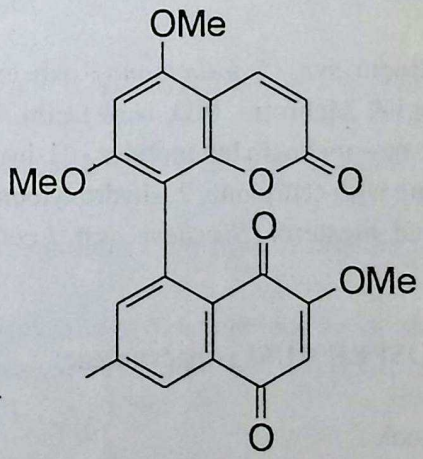
(+)Toddalolactone



8-Formyllimettin



Toddacoumalone



Toddacoumaquinone

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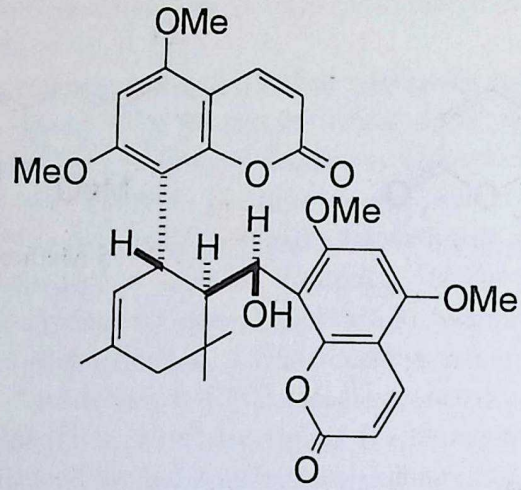

Toddalosin

T. asiatica (L.) Lam. var. *obtusifolia* Gamble

Ethanol extract (10.0 and 50.0 mg/ml) caused concentration-dependent inhibition (15.0 to 70.0%) of spasmogen-induced contraction of guinea pig ileum.

Toddalactone, toddasin, toddanone, skimmianine and 5,7-dimethoxy-6-(3-chloro-2-hydroxy-3-methylbutyl)coumarin (I) isolated (*Indian Drugs* 1989, *26,* 706).

Distribution: Tamil Nadu and Kerala.

BIOLOGICAL ACTIVITY

Among coumarins, chlorocoumarin (I) showed the most potent spasmolytic activity as tested on isolated guinea pig ileum preparation (*Indian Drugs* 1989, *26,* 706).

TOONA (Meliaceae)

T. ciliata M.Roem. syn. *Cedrela toona* Roxb. ex Rottl. & Willd. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 650).

Two new meliacin butenolides - 21-hydroxycedrelonelide and 23-hydroxycedrelonelide - isolated along with cedrelone, 23-hydroxytoonacilide, α-amyrin, β-amyrin, siderin, scopoletin, isofraxidin and sitosterol (*Biochem. Syst. Ecol.* 1994, *22,* 323; *Chem. Abstr.* 1994, *121,* 53959 t).

TRACHELOSPERMUM (Apocynaceae)

T. axillare Hook.f.

Isolation of new lignan - traxillaside - from bark and its structure determination; arctigenin, arctiin, trachelogenin, tracheloside, traxillagenin, matairesinol, matairesinoside, nortrachelogenin and nortracheloside also isolated (*Phytochemistry* 1993, *32,* 1597).

Distribution: Himalayas, Sikkim, alt. 1200-1800 m.

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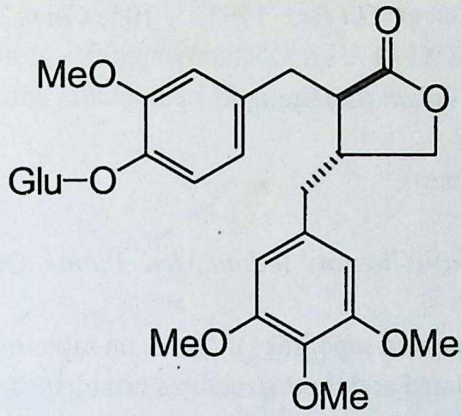
NEW COMPOUNDS



Traxillaside

T. gracilipes Hook.f.

Luteolin-7-O-glucoside and luteolin-4-O-glucoside besides 7-O-glucoside, 7-O-diglucoside, 7-O-neohesperidoside and 7-O-rutinoside of apigenin isolated (*Zhonghua Yaoxue Zazhi* 1992, *44,* 395; *Chem. Abstr.* 1993, *118,* 77097 z); tracheloside, arctiin and matairesinoside isolated (*Zhonghua Yaoxue Zazhi* 1993, *45,* 195; *Chem. Abstr.* 1993, *119,* 266441 p).

Distribution: Assam and Meghalaya.

BIOLOGICAL ACTIVITY

Arctiin exhibited potent anti-HIV activity (*Zhonghua Yaoxue Zazhi* 1993, *45,* 195; *Chem. Abstr.* 1993, *119,* 266441 p).

TRACHYCARPUS (Arecaceae)

T. excelsa Wendl.; see *T. fortunei* (Hook.) Wendl.

T. fortunei (Hook.) Wendl. syn. *T. excelsa* Wendl. (*excelsus*) (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 737).

A protein - TP-1 - isolated from inflorescence (*Zhiwu Shengli Xuebao* 1993, *19,* 167; *Chem. Abstr.* 1993, *119,* 245599 f).

Distribution: Native of Burma and China, grown in gardens in north-eastern India and elsewhere.

BIOLOGICAL ACTIVITY

Tp-1 at 1.0 mg/ml inhibited growth of mycelia of *Trichoderma viride* and also that of some crop fungal pathogens (*Zhiwu Shengli Xuebao* 1993, *19,* 167; *Chem. Abstr.* 1993, *119,* 245599 f).

TRACHYSPERMUM (Apiaceae)

T. ammi (L.) Sprague syn. *Carum copticum* Benth. & Hook. , *Trachyspermum copticum* (L.) Link (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 737).

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Thymol (61.0), p-cymene (15.6) and γ-terpinene (11.9%) determined in fruit essential oil from Turkish plant (*J. Essent. Oil Res.* 1993, *5*, 105; *Chem. Abstr.* 1993, *118*, 219433 g).

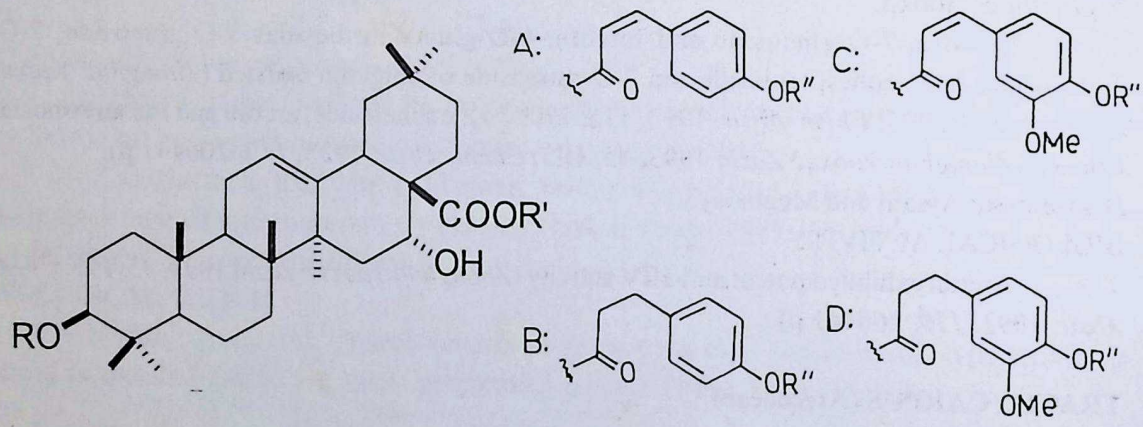
T. copticum (L.) Link; see *T. ammi* (L.) Sprague

TRAGOPOGON (Asteraceae)

T. porrifolius L. (*porrifolium*) (*Glossary Indian Med. Plants*, Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 246).

Eighteen new triterpenoid saponins - tragopogon saponins A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q and R - isolated and their structures established *Chem. Pharm. Bull.* 1991, *39*, 388).

NEW COMPOUNDS



Name	R	R'	R''
Tragopogon saponin A	Gluc.acid	H	-
Tragopogon saponin B	Gluc.acid	Xyl(2—A)	H
Tragopogon saponin C	Gluc.acid	Xyl(2—C)	H
Tragopogon saponin D	Gluc.acid	Xyl(2—C)	Glu
Tragopogon saponin E	Gluc.acid	Ara(2—C)	Glu
Tragopogon saponin F	Gluc.acid	Xyl(2—A)(3→1)Glu	H
Tragopogon saponin G	Gluc.acid	Xyl(2—B)(3→1)Glu	H
Tragopogon saponin H	Gluc.acid	Ara(2—A)(3→1)Glu	H
Tragopogon saponin I	Gluc.acid	Ara(2—B)(3→1)Glu	H
Tragopogon saponin J	Gluc.acid	Ara(2—D)(3→1)Glu	H
Tragopogon saponin K	H	Ara(2—A)(3→1)Glu	H
Tragopogon saponin L	H	Ara(2—B)(3→1)Glu	H
Tragopogon saponin M	H	Ara(2—D)(3→1)Glu	H
Tragopogon saponin N	Gluc.acid	Xyl(2—A)(3→1)Glu	Glu
Tragopogon saponin O	Gluc.acid	Xyl(2—B)(3→1)Glu	Glu
Tragopogon saponin P	Gluc.acid	Ara(2—B)(3→1)Glu	Glu
Tragopogon saponin Q	H	Ara(2—A)(3→1)Glu	Glu
Tragopogon saponin R	Gluc.acid	Ara(2—D)(3→1)Glu	Glu

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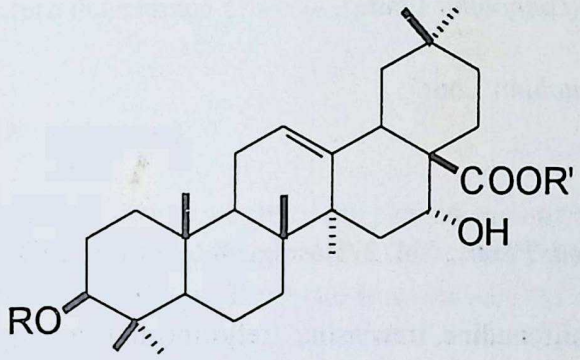
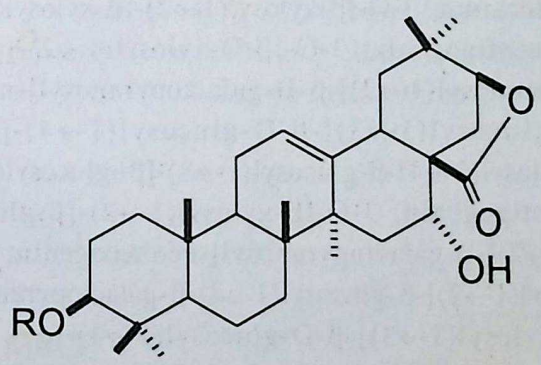
T. pratensis L. (*pratense*) (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 246).

Nine oleanane saponins - tragopogonosides A, B, C, D, E, F, G, H and I - isolated from whole plant and their structures elucidated (*Phytochemistry* 1992, *31,* 2087).

NEW COMPOUNDS



Name	R	R'
Tragopogonoside A	Gluc.acid	Xyl
Tragopogonoside B	Gluc.acid(2→1)Gal	H
Tragopogonoside C	Gluc.acid(2→1)Gal	Xyl
Tragopogonoside D	Gluc.acid	Xyl(3→1)Glu
Tragopogonoside E	Gluc.acid(2→1)Gal	Xyl(3→1)Glu
Tragopogonoside F	Gluc.acid(2→1)Gal	Xyl[(2-p-coumaroyl)](3→1)Glu
Tragopogonoside G	Gluc.acid(2→1)Gal	Xyl(2-p-coumaroyl)
Tragopogonoside H	Gluc.acid(2→1)Gal	Xyl(2-feruloyl)



Tragopogonoside I
R = Gluc.acid(2→1)Gal

TREMA (Ulmaceae)

T. cannabina Lour. syn. *T. timorensis* (Decne.) Blume, *T. virgata* (Roxb.) Blume (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 653).

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Isolation of stigmast-4-en-3-one, 6β-hydroxystigmast-4-en-3-one, 3β-hydroxystigmast -4-en-6-one, 24(R)ethyl-5α-cholestane-3β,6α-diol, methyl p-hydroxybenzoate, p-hydroxybenzaldehyde and methyl 2,3-dihydro-2-methylbenzofuran-7-carboxylate from heartwood (*Huaxue* 1992, *50,* 343; *Chem. Abstr.* 1994, *120,* 73447 g).

T. timorensis (Decne.) Blume; see *T. cannabina* Lour.

T. virgata (Roxb.) Blume; see *T. cannabina* Lour.

TREWIA (Euphorbiaceae)

T. nudiflora L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 653).

Isolation of trenudine, 10-epitrenudine, trewiasine, treflorine and caffeine from seeds (*Yunnan Zhiwu Yanjiu* 1991, *13,* 432; *Chem. Abstr.* 1992, *117,* 86673 r).

TRIADENUM (Hypericaceae)

T. japonicum (Blume) Makino; see *Hypericum japonicum* Thunb. ex Murr.

TRIBULUS (Zygophyllaceae)

T. cistoides L.

Neotigogenin, neogitogenin, neohecogenin, N-docosanoyltyramine, N-tetracosanoyltyramine, tribulosin, cistocardin, 3-O-[β-xylosyl(1→2)-[β-xylosyl(1→3)]-β-glucosyl(1→4)-β-D-galactopyranosyl]-neotigogenin; 3-O-[β-D-xylosyl(1→2)-[β-D-xylosyl(1→3)]-β-D-glucosyl(1→4)-[α-L-rhamnosyl(1→2)]-β-D-galactopyranosyl]-neohecogenin; 3-O-[β-D-glucosyl(1→2)-[β-D-glucosyl(1→3)]-β-D-glucosyl(1→4)-β-D-galactopyranosyl]-neotigogenin; 3-O-[β-xylosyl(1→4)-β-glucosyl(1→3)-[β–glucosyl(1→2)]-β-glucosyl(1→4)-β-galactopyranosyl]-neotigogenin; 3-O-[β-xylosyl(1→2)-[β-glucosyl(1→3)]-β-glucosyl (1→4)-[α-rhamnosyl(1→2)]-β-galactopyranosyl]-neohecogenin; 3-O-[β-xylosyl(1→4)-β-glucosyl(1→3)-[β-glucosyl(1→2)]-β-glucosyl(1→4)-β-galactopyranosyl]-neogitogenin; 3-[β-D-xylosyl(1→2)-[β-D-xylosyl(1→3)]-β-D-glucosyl(1→4)-[α-L-rhamnosyl(1→2)]-β-D-galactosyl]-26-(β-glucosyl)-22-methoxy-(3β,5α,25S)-furostan-2,26-diol, D(+)pinitol and sucrose isolated (*Phytochemistry* 1994, *35,* 1527).

Distribution: West Bengal, Tamil Nadu and Kerala.

T. terrestris L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 738).

Tigogenin, hecogenin and gitogenin identified in hydrolysed extract of fruits, roots,

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leaves and stems (*Yaowu Fenxi Zazhi* 1991, *11,* 70; *Chem. Abstr.* 1991, *115,* 89149 u); diosgenin content determined by HPLC in roots (0.13%), stems (0.78%), leaves (0.12%) and fruits of plant growing in Turkey (*Pharmacia* 1991, *31,* 90; *Chem. Abstr.* 1992, *116,* 231877 w); isolation of diosgenin, hecogenin, ruscogenin and spirosta-3,5-diene from flowers (*Fitoterapia* 1992, *63,* 90); a new cinnamic amide - terrestriamide - isolated along with 7-methylhydroindanone and its structure determined (*Yaoxue Xuebao* 1994, *29,* 204; *Chem. Abstr.* 1994, *121,* 153289 t).

TRICHILIA (Meliaceae)

T. connaroides (Wt. & Arn.) Bentvelzen syn. *Heynea trijuga* Roxb. ex Sims.(*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 738).

Isolation of trijugin B acetate from leaves (*Indian J. Chem.* 1990, *29*B, 970).

TRICHOLEPIS (Asteraceae)

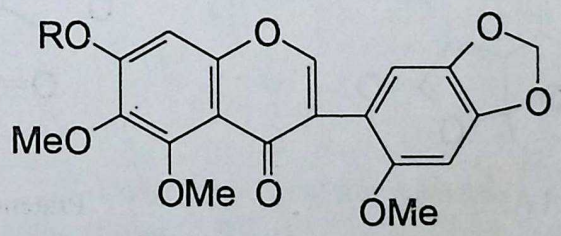
T. procumbens Wt.; see *Amberboa ramosa* (Roxb.) Jafri

TRICHOSANTHES (Cucurbitaceae)

T. anguina L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 247).

Isolation of hentriacontane, ceryl alcohol, α-amyrin, taraxerone, sucrose and β-sitosterol from fruits (*Fitoterapia* 1990, *61,* 187); kaempferol, its 3-O-glucoside and quercetin isolated from seeds (*Asian J. Chem.* 1994, *6,* 182; *Chem. Abstr.* 1994, *120,* 294194 z); a new isoflavone glucoside (I) isolated from seeds and characterised as 5,6,6'-trimethoxy-3',4'-methylenedioxyisoflavone-7-O-β-D-(2"-O-p-coumaroylglucopyranoside) (*Phytochemistry* 1994, *36,* 1519).

NEW COMPOUNDS



I

R = Glu(2-p-coumaroyl)

T. cucumerina L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 657).

Isolation of cucurbitacin B from fruits and its ^{13}C-NMR spectrum (*Warasan Phesatchasat* 1992, *19,* 5; *Chem. Abstr.* 1994, *121,* 175168 e).

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TRIDAX (Asteraceae)

T. procumbens L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 739).

Campesterol, stigmasterol and β-sitosterol isolated from unsaponifiable fraction (*Indian J. Pharm. Sci.* 1992, *54,* 191).

TRIFOLIUM (Papilionaceae)

T. pratense L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 740).

Extract containing flavonoids if given 3-5 min before aconitine, showed antiarrhythmic activity against aconitine-induced arrhythmia in rats, ED50 was 69.0 mg/kg (*Farmatsiya* 1992, *41,* 65; *Chem. Abstr.* 1992, *117,* 184538 v); oral administration of flavonoid extract showed similar effects on small intestinal motility as acetylcholine in increasing luminal pressure (*Farmatsiya* 1992, *41,* 78; *Chem. Abstr.* 1993, *118,* 183169 j).

Isolation of myo-inositol from leaves (*Acta Physiol. Plant.* 1989, *11,* 97; *Chem. Abstr.* 1990, *113,* 168942 j); biochanin A, a potent inhibitor of metabolic activation of carcinogen benzo[a]pyrene in cell culture, isolated (*Cancer Lett.* 1991, *60,* 15; *Chem. Abstr.* 1991, *115,* 269994 z); aminopropylhomospermidine identified in seeds (*Can. J. Bot.* 1992, *70,* 1984; *Chem. Abstr.* 1993, *118,* 98056 a); isolation of pratenols A and B from aerial parts of plant infected by *Kabatiella caulivora* and their structures determined (*Biosci., Biotechnol., Biochem.* 1992, *56,* 1955; *Chem. Abstr.* 1993, *118,* 251424 r).

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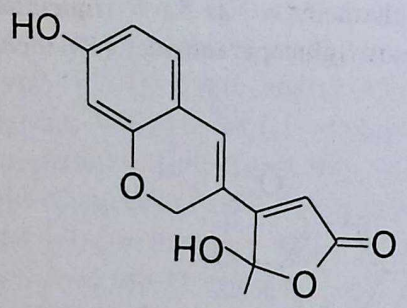
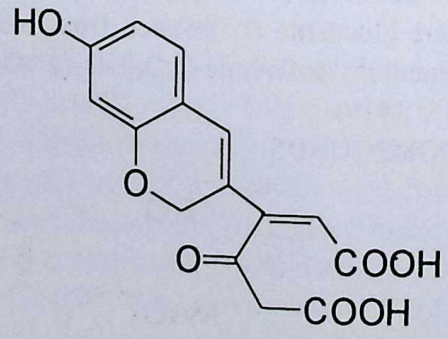


Pratenol A



Pratenol B

TRIGONELLA (Papilionaceae)

T. foenum-graecum L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 740).

Chronic administration of seed extract enhanced food consumption and motivation to

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eat in rats and also induced hyperinsulinemia and hypocholesterolaemia (*Pharmacol. Biochem. Behav.* 1993, *45,* 369; *Chem. Abstr.* 1993, *119,* 108770 r); saponin fraction (500.0 μg/ml) haemolysed sheep erythrocytes and at it showed detectable foaming at 0.02% (*Pakistan Vet. J.* 1993, *13,* 185; *Chem. Abstr.* 1994, *120,* 173186 q).

Seed from India, China, Afghanistan and Pakistan contained crude protein (28.7-30.8%) and oil (5.5-6.0%) dry wt. (*Rastit. Resur.* 1990, *26,* 80; *Chem. Abstr.* 1990, *112,* 213879 m); seeds yielded saponin (14.1%) (*Pakistan Vet. J.* 1993, *13,* 185; *Chem. Abstr.* 1994, *120,* 173186 q).

TRILLIUM (Trilliaceae)

T. tschonoskii Maxim. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 742).

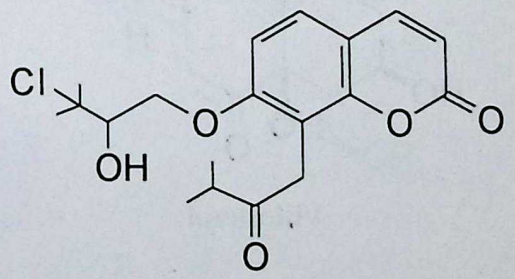
Kaempferol-3-O-arabinosylgalactoside and quercetin-3-O-arabinosylgalactoside and their acetylated derivatives isolated from leaves (*Bot. Maq. Tokyo* 1992, *105,* 555; *Chem. Abstr.* 1993, *119,* 221636 q).

TRIPHASIA (Rutaceae)

T. trifolia (Burm.f.) P.Wils. syn. *T. trifoliata* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 742).

A new coumarin - 3"-dehydroxy-3"-chlorotriphasiol - isolated from leaves and its structure elucidated; O-methylhalfordinol, isopimpinellin , oxypeucedanin , heraclenol and byakangelicine also isolated (*J. Nat. Prod.* 1994, *57,* 846); aurapten and heraclenol isolated (*Fitoterapia* 1994, *65,* 179).

NEW COMPOUNDS



3"-Dehydroxy-3"-chlorotriphasiol

T. trifoliata DC.; see *T. trifolia* (Burm.f.) P.Wils.

TURBINA (Convolvulaceae)

T. corymbosa (L.) Rafin. syn. *Rivea corymbosa* Hailler f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 743).

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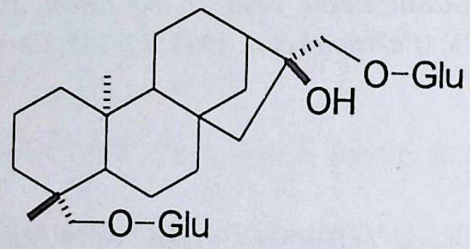
Galactomannan composed of galactose and mannose in ratio of 1:7.2 isolated from seeds (*Phyton* 1990, *51*, 103; *Chem. Abstr.* 1991, *115*, 179336 g); a new glycoside - epicorymbosin - isolated from Mexican plant and characterised as 17,19-di-O-β-D-glucopyranoside of ent-16α,17,19-kauranetriol (*J. Nat. Prod.* 1993, *56*, 771).

NEW COMPOUNDS



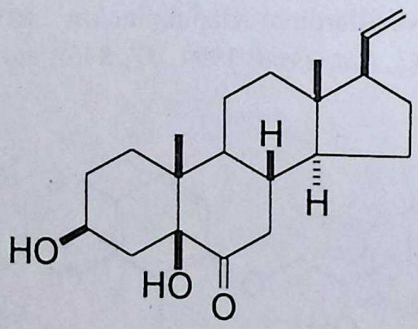
Epicorymbosin

TURRAEA (Meliaceae)

T. villosa Benn. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 249).

A new pregnane steroid - villosterol - isolated and its crystal structure determined (*Phytochemistry* 1993, *33*, 901).

NEW COMPOUNDS



Villosterol

TUSSILAGO (Asteraceae)

T. farfara L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 744).

A new terpene - farfaratin - isolated from flower buds and its structure established (*Yaoxue Xuebao* 1989, *24*, 913; *Chem. Abstr.* 1990, *112*, 171983 h); isolation of three new olefins - 1,5(Z)-undecadiene, 5(Z),8(Z)-tridecadiene and 1,5(Z),8(Z)-heptadecatriene - from

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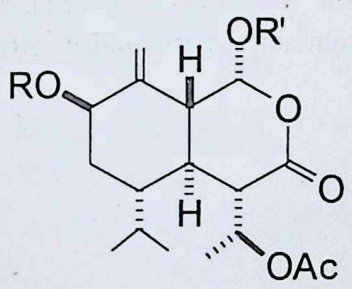
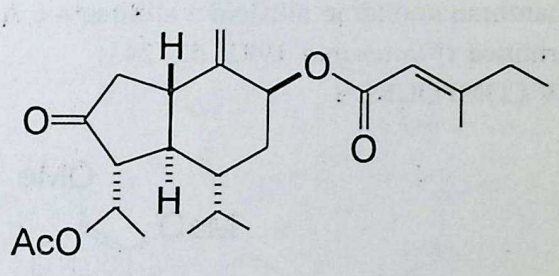
buds (*Yakugaku Zasshi* 1992, *112,* 571; *Chem. Abstr.* 1993, *118,* 45563 g); methyl 3,4-di-O-caffeoylquinate, chlorogenic acid, isoquercitrin, astragalin, senkirkine, phytosterol and rutin isolated from flower buds (*Annu. Rep. Tohoku Coll. Pharm.* 1992, *39,* 69; *Chem. Abstr.* 1994, *120,* 73418 y); isolation and structure elucidation of 7β-(3-ethyl-cis-crotonoyloxy)-14-hydroxynotonipetranone (I), 14-acetoxy-7β-angeloyloxynotonipetranone (II), 14-acetoxy-7β-senecioyloxynotonipetranone (III) and tussilagolactone from flower buds; in addition, 7β-(3-ethyl-cis-crotonoyloxy)-14-hydroxy-1α-(2-methylbutyryloxy)-notonipetranone and 7β-(3-ethyl-cis-crotonoyloxy)-1α-(2-methylbutyryloxy)3,14-dehydro-Z-notonipetranone isolated (*Chem. Pharm. Bull.* 1992, *40,* 2753); senkirkine, senecionine, integerrimine, seneciphylline, neosenkirkine, tussilagine and isotussilagine obtained from Turkish plant containing 0.1% alkaloids (*J. Fac. Pharm. Gazi Univ.* 1993, *10,* 137; *Chem. Abstr.* 1994, *120,* 294198 d).

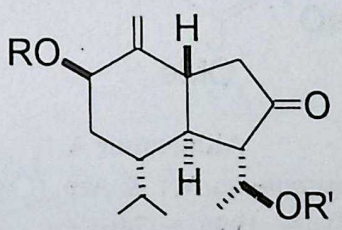
NEW COMPOUNDS





Tussilagolactone
R = 3-Ethyl cis-crotonoyl, R' = 2-Me Butyryl

Farfaratin



I
R = 3-Ethyl cis-crotonoyl, R' = H
II
R = Angeloyl, R' = Ac
III
R = Senecioyl, R' = Ac

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BIOLOGICAL ACTIVITY

Farfaratin increased blood pressure in laboratory animals (*Yaoxue Xuebao* 1989, *24*, 913; *Chem. Abstr.* 1990, *112*, 171983 h).

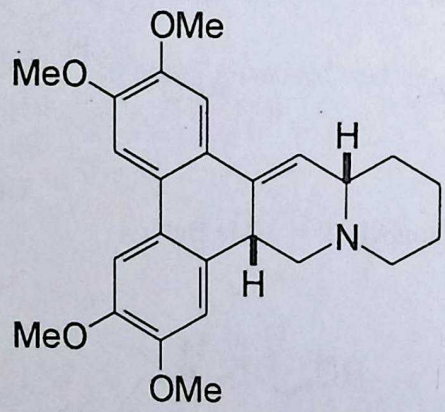
TYLOPHORA

T. asthmatica Wt. & Arn.; see *T. indica* (Burm.f.) Merr.

T. hirsuta (Wall.) Wt. & Arn. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 745).

Isolation of gymnorhizol and β-sitosterol from aerial parts (*Fitoterapia* 1991, *62*, 284); octacos-15,20-dien-11-ol, triacont-15,19,23-trien-13-ol, triacontan-1-ol, tritriacontane and gymnorhizol isolated from aerial parts (*J. Indian Chem. Soc.* 1991, *68*, 253); a new phenanthraquinolidine alkaloid - alihirsutine A - isolated from aerial parts and its structure determined (*Fitoterapia* 1992, *63*, 243).

NEW COMPOUNDS



Alihirsutine A

T. indica (Burm.f.) Merr. syn. *T. asthmatica* Wt. & Arn. (*Compend. Indian Med. Plants*, Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 746).

Isolation and structure determination of new alkaloids - tyloindicines A, B, C, D and E; in addition (+)14-hydroxyisotylocrebrine, 4,6-desdimethylisotylocrebrine, tylophorine, 6-demethyltylophorine, tylophorinidine and 5-hydroxy-O-methyltylophorinidine isolated (*Phytochemistry* 1989, *28*, 3513); tetratriacontanol, octacosanyl octacosanoate, α-amyrin, β-amyrin, stigmasterol and β-sitosterol isolated (*Fitoterapia* 1991, *62*, 93); septicine and tylophorine synthesised (*Tetrahedron Lett.* 1991, *32*, 5919); five new dihydrophenanthro-indolizine alkaloids - tyloindicines F, G, H, I and J - and a benzocyclopent-substituted phenanthrene - tyloindane - isolated from aerial parts and their structures established; tylophorine also obtained (*J. Nat. Prod.* 1991, *54*, 1271).

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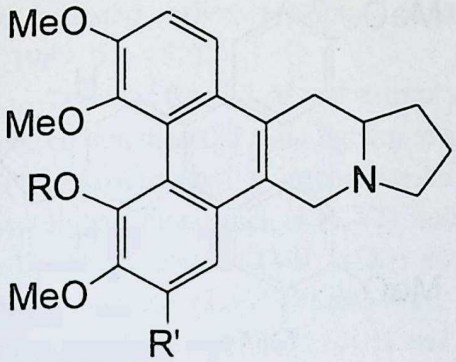
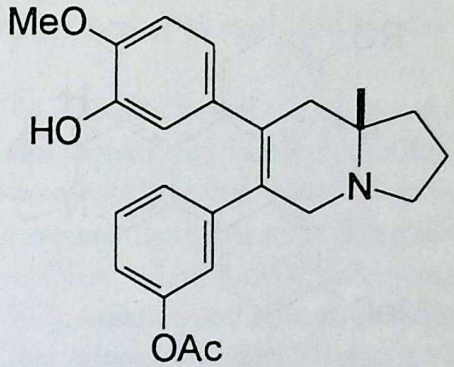
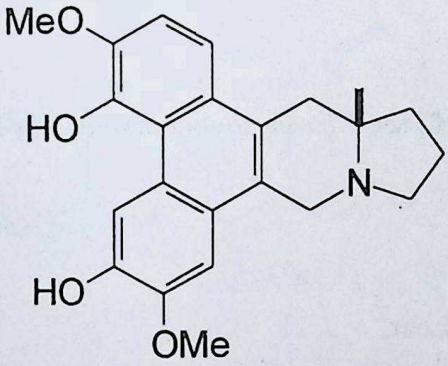
NEW COMPOUNDS



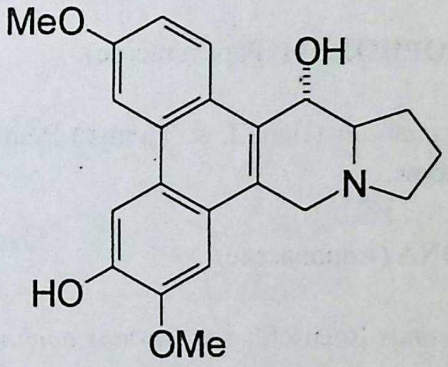
Tyloindicine A
R = Me, R' = H
Tyloindicine D
R = H, R' = OMe



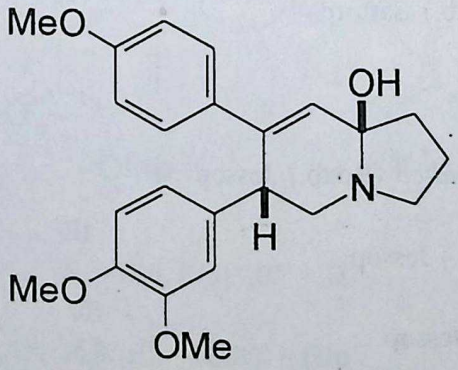
Tyloindicine B



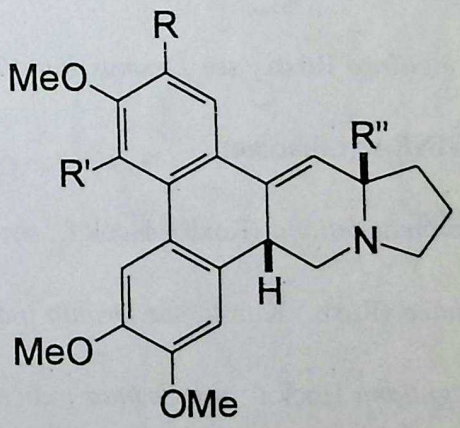
Tyloindicine C



Tyloindicine E



Tyloindicine F



Tyloindicine G
R = OMe, R' = H, R" = OH
Tyloindicine H
R,R" = H, R' = OH

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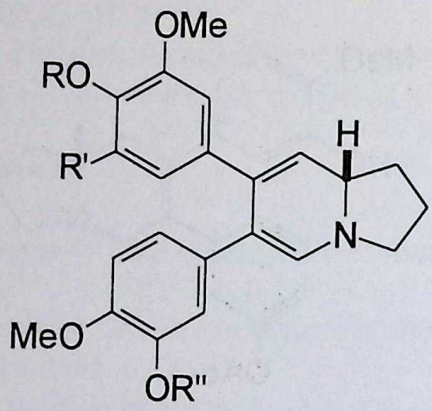
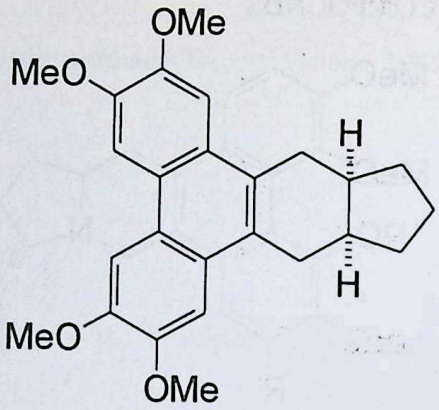


Tyloindicine I
R,R" = Me, R' = OH
Tyloindicine J
R,R' = H, R" = Ac



Tyloindane

TYLOPHORUM (Papaveraceae)

T. lactucoides (Hook.f. & Thoms.) Benth. & Hook.f.; see *Dicranostigma lactucoides* Hook.f. & Thoms.

UNONA (Annonaceae)

U. desmos Raeusch.; see *Desmos cochinchinensis* Lour.

U. discolor Vahl; see *Desmos chinensis* Lour.

U. longiflora Roxb.; see *Desmos longiflorus* (Roxb.) Safford

URGINEA (Liliaceae)

U. coromandeliana (Roxb.) Hook.f.; see *Drimia indica* (Roxb.) Jessop

U. indica (Roxb.) Kunth; see *Drimia indica* (Roxb.) Jessop

U. wightiana Hook.f.; see *Drimia indica* (Roxb.) Jessop

URTICA (Urticaceae)

U. dioica L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 747).

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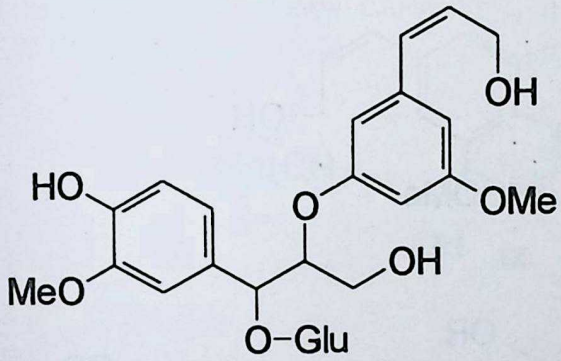
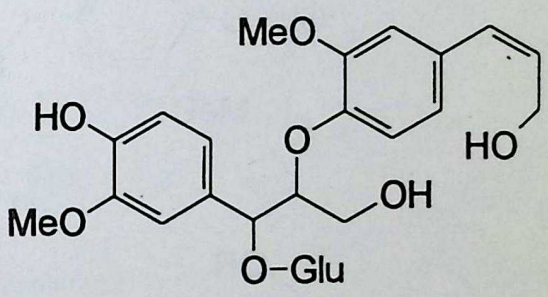
A polysaccharide fraction obtained from aqueous extract showed anti-inflammatory activity in carrageenin-induced rat paw oedema and lymphocyte transformation test. A lectin (UDA), isolated earlier, was found to stimulate proliferation of human lymphocytes (*Planta Med.* 1989, *55,* 452).

Phenolic fraction of root extract analysed by GC-MS after trimethylsilation and eighteen phenolic compounds and eight lignans identified including homovanillyl alcohol, vanillin, vanillic acid, (+)isolariciresinol, (−)secoisolariciresinol and neoolivil (*Phytochemistry* 1990, *29,* 1653); six new lignan glucosides (I to VI) isolated from roots and their structures determined; five more lignan glucosides (VII to XI) obtained (*Ann. Chem.* 1990, 1205); caffeoylmalic and chlorogenic acids isolated (*Planta Med.* 1991, *57,* 507); isolation and structure elucidation of three new terpenediols (XII to XIII and XIV) and their glucosides (XV,XVI and XVII) from roots (*Phytochemistry* 1991, *30,* 1203); 9-hydroxy-10(E),12(Z)-octadecadienoic acid in major component of roots (*Ann. Chem.* 1991, 335).

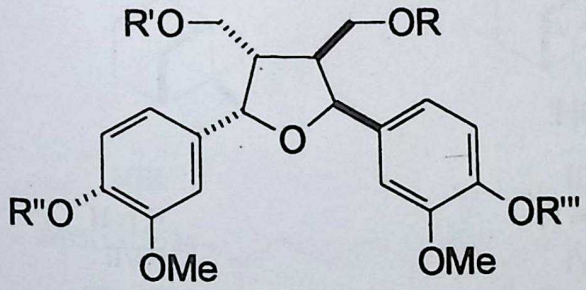
NEW COMPOUNDS



I



II



III

R = Glu, R',R",R''' = H

VII

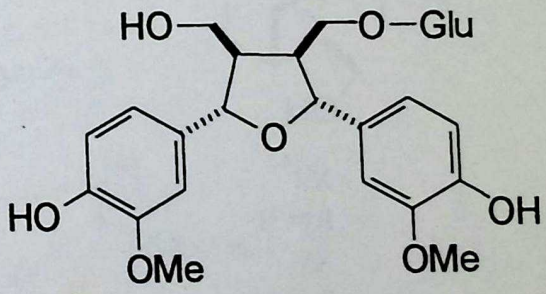
R,R',R" = H, R''' = Glu

VIII

R = Ac, R',R" = H, R''' = Glu

IX

R,R' = Ac, R"= H, R''' = Glu



IV

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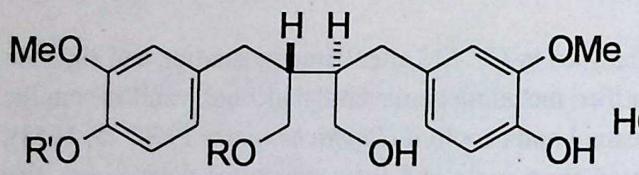
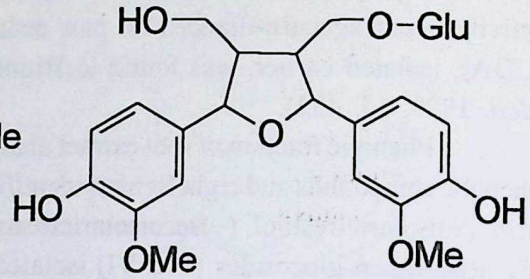
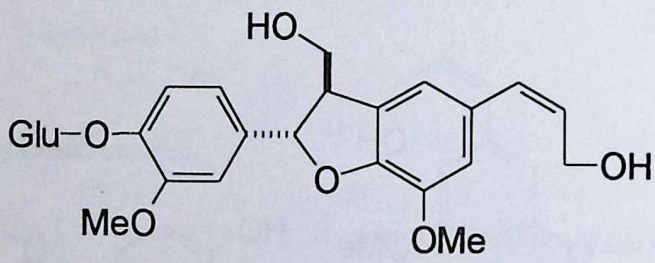


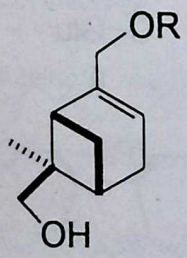


V
R = H, R' = Glu
X
R = Glu, R' = H

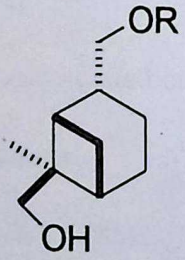
VI



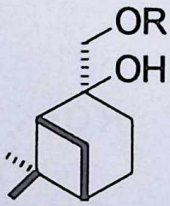
XI



XII
R = H
XV
R = Glu



XIII
R = H
XVI
R = Glu



XIV
R = H
XVII
R = Glu

BIOLOGICAL ACTIVITY

9-Hydroxy-10(E),12(Z)-octadecadienoic acid showed aromatase inhibitory activity (*Ann. Chem.* 1991, 335).

U. urens L.

Chlorogenic and 3- and 4-caffeoylquinic acids isolated (*Planta Med.* 1991, *57*, 507). Distribution: Jammu, Punjab and Uttar Pradesh upto 600 m.

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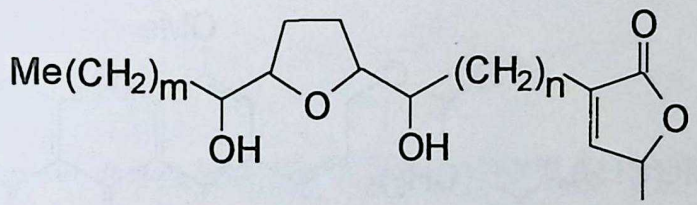
UVARIA (Annonaceae)

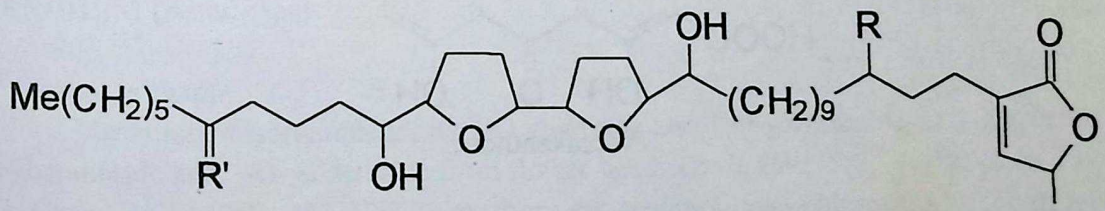
U. narum (Dunal) Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 747).

Three new acetogenins - uvariamicin I, uvariamicin II and uvariamicin III - isolated from root bark and their structures elucidated (*Tetrahedron Lett.* 1990, *31,* 4649); isolation and structure determination of two new acetogenins - squamocin-28-one and panalicin - from root bark along with squamocin (*Phytochemistry* 1991, *30,* 545); three more new acetogenins - isodesacetyluvaricin, narumicin I and narumicin II - isolated from root bark and their structures established; latter two compounds are stereoisomers; glutinone, glutinol, taraxerol, β-sitosterol and benzyl benzoate also isolated (*Phytochemistry* 1991, *30,* 2373); determination of bornyl acetate (15.2) and patchoulenone (8.1%) in essential oil of root bark of plant grown in Kerala (*J. Essent. Oil Res.* 1992, *4,* 475; *Chem. Abstr.* 1993, *118,* 240542 b); 2D-NMR of patchoulenone (*Magn. Reson. Chem.* 1992, *30,* 295; *Chem. Abstr.* 1992, *116,* 235898 b).

NEW COMPOUNDS



Uvariamicin I
m = 13, n =12
Uvariamicin II
m = 11, n = 14
Uvariamicin III
m = 9, n = 16



Squamocin-28-one
R = H, R' = O
Panalicin
R = OH, R' = H,OH
Isodesacetyluvaricin
R = H, R' = H,H
Narumicin II
R = OH, R' = H,H

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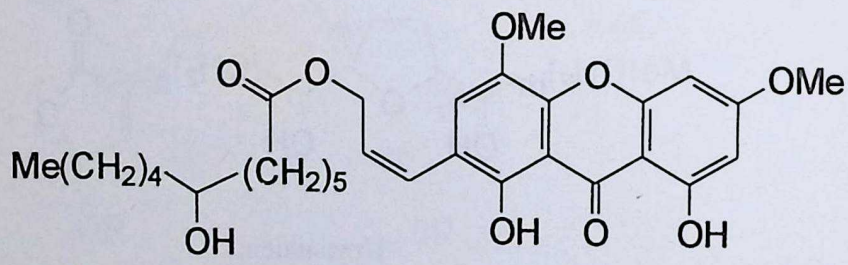
VACCARIA (Caryophyllaceae)

V. pyramidata Medik. var. *pyramidata* syn. *Saponaria vaccaria* L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 221).

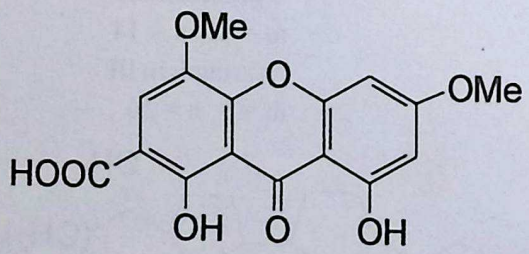
A purified saponin fraction showed maximum haemolytic activity at concentration of 7.7 μg/ml (*Pakistan Vet. J.* 1993, *13,* 185; *Chem. Abstr.* 1994, *120,* 173186 q).

Isolation of a new xanthone - vaccaxanthone - and its characterisation as 1,8-dihydroxy-3,5-dimethoxyxanthone 7-carboxylic acid (*Heterocycles* 1989, *29,* 1923); a new xanthone - sapxanthone - isolated and characterised as 1,8-dihydroxy-3,5-dimethoxy-9H-xanthen-9-one (*Phytochemistry* 1989, *28,* 3572); isolation of a new oligosaccharide - vaccariose - and its structure elucidation as glucose(3→2)xylose(4→3)glucose (*Fitoterapia* 1990, *61,* 223); saponins (10.7%) obtained from roots (*Pakistan Vet. J.* 1993, *13,* 185; *Chem. Abstr.* 1994, *120,* 173186 q); isolation of lanosterol, stigmasterol, β-sitosterol and diosgenin from different parts of plant (*J. Indian Bot. Soc.* 1993, *12,* 173; *Chem. Abstr.* 1994, *121,* 226419 x).

NEW COMPOUNDS



Sapxanthone



Vaccaxanthone

VALERIANA (Valerianaceae)

V. jatamansi Jones syn. *V. wallichii* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 748).

A new naphthoic acid isolated from rhizomes and characterised as 4-methoxy-8-pentyl-1-naphthoic acid (*Phytochemistry* 1993, *32,* 1350); isolation and structure elucidation of heptadecanyl eicosanoate and methyl eicosanoate from rhizomes; β-sitosterol and its glucoside also isolated (*Indian Drugs* 1993, *30,* 138).

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BIOLOGICAL ACTIVITY

Valtrate and didrovaltrate were cytotoxic to hepatoma cells in culture and inhibited synthesis of DNA and protein in tumor cells (*Phytother. Res.* 1993, *7,* 124; *Chem. Abstr.* 1993, *119,* 20073 e).

V. wallichii DC.; see *V. jatamansi* Jones

VANDA (Orchidaceae)

V. roxburghii R.Br.; see *V. tessellata* Hook. ex G.Don

V. tesellata (Roxb.) Hook. ex G.Don syn. *V. roxburghii* R.Br. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mherotra, PID, New Delhi, 1990, p. 426).

Petroleum ether, chloroform and methanol extracts of roots showed 54.3, 42.1 and 21.9% anti-inflammatory activity respectively at a dose of 0.5 g/kg in rats.

Roots yielded tetracosyl ferulate and β-sitosterol glucoside (*Indian J. Pharm. Sci.* 1992, *54,* 159).

VATERIA (Dipterocarpaceae)

V. indica L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 748).

Seeds contained 37.82% total lipids comprising neutral lipids (75.8%, predominantly triglycerides) and glycolipids (23.1%, mainly sterol glycosides); phosphatidylethanolamine identified as major constituent of phospholipids and palmitic and stearic acids identified in all lipid fractions (*J. Food Sci. Technol.* 1989, *26,* 322; *Chem. Abstr.* 1990, *112,* 234160 k; *J. Food Sci. Technol.* 1991, *28,* 195; *Chem. Abstr.* 1992, *116,* 104768 m).

VENIDIUM (Asteraceae)

V. fastuosum Stapf

Isolation of isorhamnetin, its 3-O-glucoside and 3-O-galactoside, and quercetin, its 3-O-rhamnoside and 3-O-galactoside from flower heads (*Bull. Fac. Sci., Assiut Univ.* 1991, *20,* 73; *Chem. Abstr.* 1992, *116,* 170129 e); four new guaianolides - chlorovenidin, chlorovenidol, 3-iso-10,14-deoxyarctolide and 9β-hydroxy-11β,13-dihydrozaluzanin C - isolated and their structures established; arctolide, 3-deacetyl-10,14-deoxyarctolide and 3-deacetyl-11,13-dihydro-10,14-deoxyarctolide also isolated (*Phytochemistry* 1992, *31,* 2781).

Distribution: South African species, introduced into Indian gardens.

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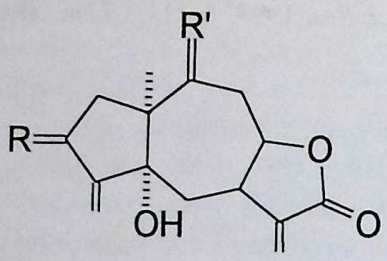
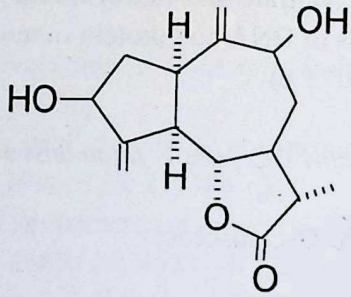
NEW COMPOUNDS



Chlorovenidin
R = α-H,β-O.COOEt, R' = β-CH_2Cl,α-OH
Chlorovenidol
R = α-H,β-OH, R' = β-CH_2Cl,α-OH
3-Iso-10,14-deoxyarctolide
R = α-OAc,β-H, R' = CH_2



9β-Hydroxy-11β,13-dihydro-zaluzanin C

VENTILAGO (Rhamnaceae)

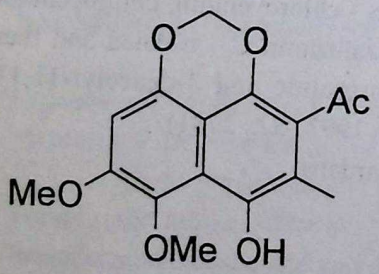
V. bombaiensis Dalz.; see *Smythea bombaiensis* (Dalz.) Banerjee & Mukherjee

V. goughii Gamble

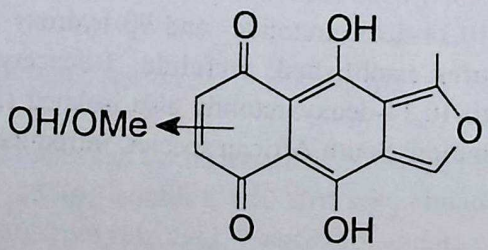
An acetophenone - goughione - and an isofuranonaphthoquinone - ventilone F - isolated from root bark and characterised as 2-acetyl-4-hydroxy-5,6-dimethoxy-3-methyl-1,8-methylenedioxynaphthalene and 4,6 (or 7),9-trihydroxy-7(or 6)-methoxy-1-methylnaphtho[2,3-c]furan-4,9-quinone respectively (*Phytochemistry* 1991, *30,* 2427); isolation of four new benzisochromanquinones - ventiloquinones L, M, N and O - from root bark and their structure elucidation; possible dimeric structure of ventiloquinone N proposed (*Phytochemistry* 1991, *30,* 3741); isolation of islandicin, 2-hydroxyislandicin, chrysophanol, physcion, xanthorin, its 5-methyl ether, emodin, 4,5-dihydroxydigitolutein, ursolic acid, lupeol and β-sitosterol from root bark and stem bark (*Acta Cienc. Indica, Chem.* 1992, *18,* 19; *Chem. Abstr.* 1994, *121,* 53926 e).

Distribution: Tamil Nadu.

NEW COMPOUNDS



Goughione



Ventilone F

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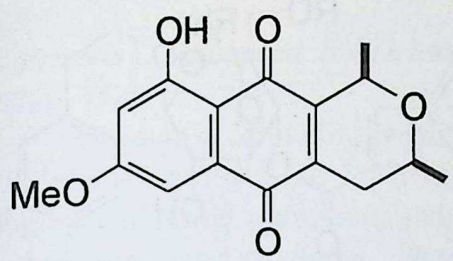
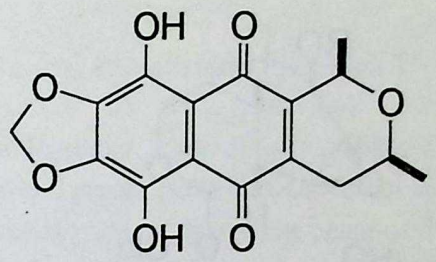
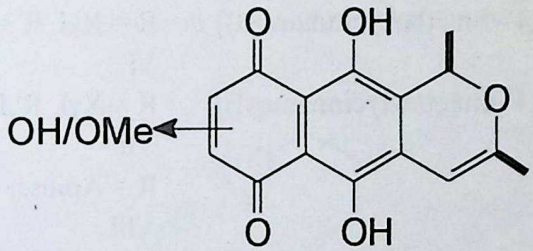


Ventiloquinone L



Ventiloquinone M



Ventiloquinone O

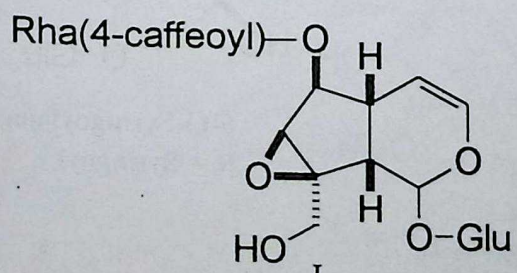
VERBASCUM (Scrophulariaceae)

V. thapsiforme Schrad.; see *V. thapsus* L.

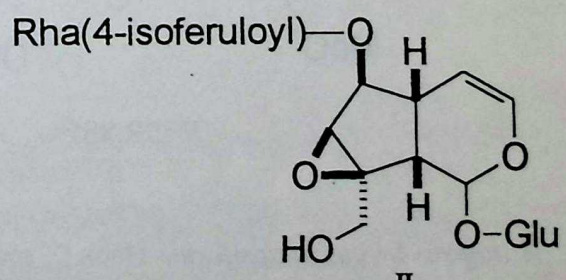
V. thapsus L. syn. *V. thapsus* L. var. *thapsiforme* Hook.f., *V. thapsiforme* Schrad. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 751).

Five new iridoid glycosides - 6-O-syringoylajugol, 6-O-[α-L-4'-(caffeoyl) rhamnosyl]catalpol (I), 6-O[α-L-4'(isoferuloyl)rhamnosyl]catalpol (II), 6-O[α-L-2'-(3",4"-dimethoxycinnamoyl)rhamnosyl]catalpol (III) and 6-O-[α-L-3'(3",4"-dimethoxycinnamoyl)-rhamnosyl]catalpol (IV) - isolated from whole plant and their structures elucidated (*Chem. Pharm. Bull.* 1991, *39,* 3261); isolation of five new phenylethanoid glycosides (V to IX) and one new lignan glycoside (X) and their structure determination; arenarioside, forsythoside B, leucosceptoside B and dehydrodiconiferyl glycosides D, E and G also isolated (*Phytochemistry* 1992, *31,* 961).

NEW COMPOUNDS



I



II

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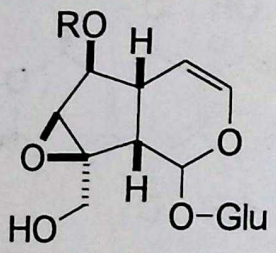
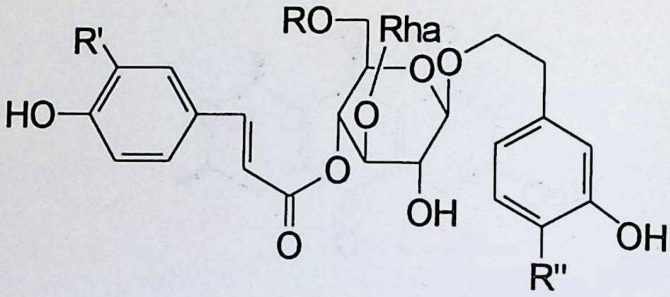
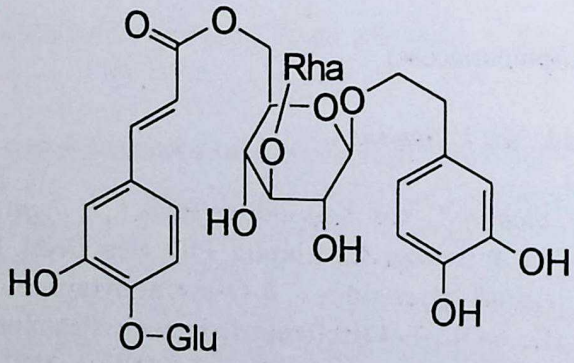


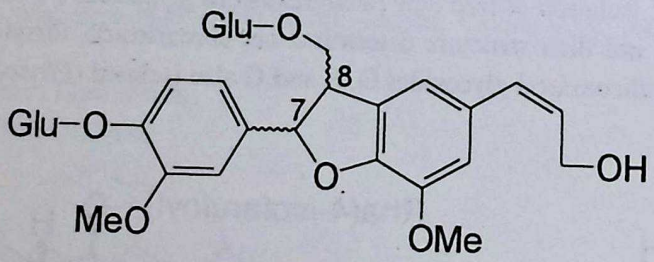


III
R = Rha[2-(3',4'-dimethoxycinnamoyl)]
IV
R = Rha[3-(3',4'-dimethoxycinnamoyl)]

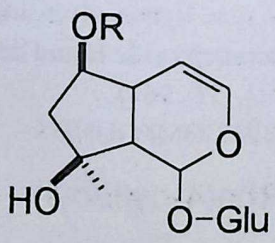
V
R = Xyl, R' = OH, R'' = OMe
VI
R = Xyl, R',R'' = OMe
VII
R = Apiose, R' = OMe, R'' = OH
VIII
R = Glu, R',R'' = OMe



IX



X (7R,8S)



6-O-Syringoylajugol
R = Syringoyl

V. thapsus L. var. *thapsiforme* Hook.f.; see *V. thapsus* L.

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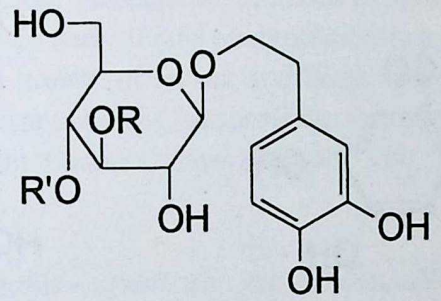
VERBENA (Verbenaceae)

V. officinalis L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 752).

Isolation of sorbifolin, pedalitin and nepetin from leaves (*J. Plant Physiol.* 1989, *135,* 380; *Chem. Abstr.* 1990, *112,* 73876 f); a new phenylpropanoid glycoside - eukovoside - isolated along with acteoside, verbenalin and hastatoside from aerial parts of Egyptian plant and its structure determined (*Bull. Fac. Pharm.,* Cairo Univ. 1990, *28,* 75; *Chem. Abstr.* 1992, *117,* 44618 w); leaves afforded luteolin-7-glucoside, pedalitin-6-glucoside, apigenin-7-galactoside and apigenin-7-glucuronide (*Pharm. Acta Helv.* 1992, *67,* 216; *Chem. Abstr.* 1992, *117,* 188276 b); verbenalol synthesised (*J. Org. Chem.* 1994, *59,* 1898).

NEW COMPOUNDS



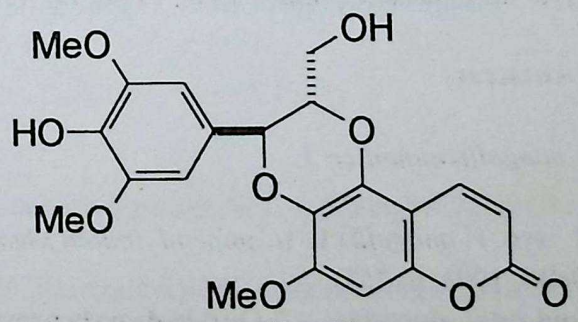
Eukovoside
R = Rha, R' = Caffeoyl

VERNICIA (Euphorbiaceae)

V. fordii (Hemsl.) Airy Shaw syn. *Aleurites fordii* Hemsl. (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 696).

A new coumarinolignoid - aleuritin - isolated from stems and its structure determined; 5,6,7-trimethoxycoumarin also obtained (*Phytochemistry* 1989, *28,* 2459); isolation of three new ellagitannins - aleurinins A, B and C - along with corilagin, geraniin and chebulagic acid and structure elucidation of new compounds (*Chem. Pharm. Bull.* 1990, *38,* 861).

NEW COMPOUNDS



Aleuritin

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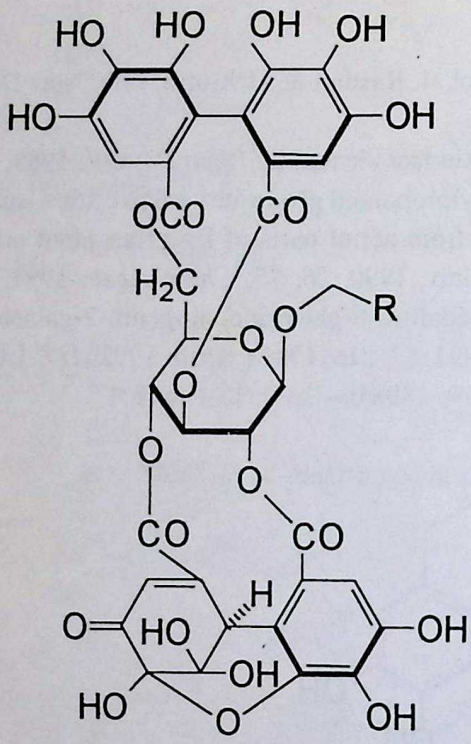
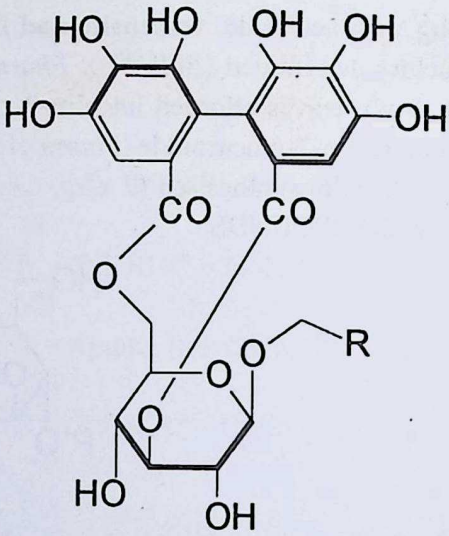


Aleurinin A
R = C(=CH_2)CN
Aleurinin C
R = Ac



Aleurinin B
R = C(=CH_2)CN

VERNONIA (Asteraceae)

V. anthelmintica Willd.: see *Centratherum anthelminticum* (L.) Kuntze

V. cinerea (L.) Less. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 753).

Isolation and structure determination of a new triterpenoid - 3β-acetoxyurs-19-ene - from roots: lupeol acetate also isolated (*Planta Med.* 1993, *59,* 458).

VERONICA (Scrophulariaceae)

V. anagallis L.: see *V. anagallis-aquatica* L.

V. anagallis-aquatica L. syn. *V. anagallis* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 753).

Two new iridoid ester glucosides - 7-O-(p-hydroxybenzoyl)8-epiloganic acid and 7-

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O-(p-hydroxybenzoyl)gardoside - isolated and their structures established; in addition, aucubin, catalpol, veronicoside, amphicoside, catalposide, verproside, minecoside and verminoside isolated (*Phytochemistry* 1993, *33*, 401).

V. anagallis-aquatica L. var. *punctata* (Buch-Ham. ex D. Don) Hook. f.; see *V. undulata* Wall.

V. persica Poir.

Isolation of aucubin, catalpol, veronicoside, amphicoside, catalposide, verproside and 6-O-veratroylcatalpol from aerial parts (*Mansoura J. Pharm. Sci.* 1991, *7*, 390; *Chem. Abstr.* 1992, *117*, 44621 s; *Zasso Kenkyu* 1991, *36*, 324; *Chem. Abstr.* 1992, *117*, 66596 q).

Distribution: Himalayas, from Kashmir to Garhwal. alt. 2100 m.

BIOLOGICAL ACTIVITY

Aucubin and its aglycone, aucubigenin, inhibited to the same degree growth of rice and white clover seedlings at 0.1 mM and 6.0 mM concentration respectively. Aucubigenin showed stronger inhibitor activity on growth of lettuce and large crabgrass seedlings than aucubin. Aucubigenin also inhibited germination of lettuce seeds. Antimicrobial activity of aucubigenin was greater than that of aucubin (*Zasso Kenkyu* 1991, *36*, 324; *Chem. Abstr.* 1992, *117*, 66596 q).

V. undulata Wall. syn. *V. anagallis – aquatica* L. var. *punctata* (Buch.-Ham. ex D.Don) Hook.f.

Isolation and structure elucidation of a new phenylethanoid triglycoside from whole plant; five known glycosides also obtained (*Chem. Abstr.* 1994, *121*, 297150 p).

Distribution : Nepal and West Bengal.

Note : Journal reference is not mentioned above because it is wrongly cited in *Chemical Abstracts.*

VETIVERIA (Poaceae)

V. zizanioides (L.) Nash syn. *Andropogon squarrosus* Hook.f. (non L.f.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 754).

Synthesis of (–)geosmin and (+)octalone (*Tetrahedron Lett.* 1989, *30*, 4121); khusilal synthesised (*Chem. Lett.* 1989, 2067; *Chem. Abstr.* 1990, *112*, 217291 m); (–)khusimone synthesised (*Proc.-Int. Congr. Essent. Oils, Fragrances Flavours.* 11th, 1989, *5*, 137; *Chem. Abstr.* 1992, *117*, 171716 b).

VICIA (Papilionaceae)

V. faba L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 755).

Isolation of N-[(–)jasmonoyl]-7(S)-tyrosine, N-[(–)jasmonoyl]-7(S)-tryptophan and N-[(+)cucurbinoyl]-7(S)-tryptophan from flowers (*Conjugated Plant Horm., Proc. Int. Symp.*

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1986, 308; *Chem. Abstr.* 1990, *112,* 52197 v); rutin, quercitrin, hyperoside, robinin, quercetin-3-arabinoside and kaempeferol-3-rutinoside isolated (*Can. J. Bot.* 1989, *67,* 3529; *Chem. Abstr.* 1990, *112,* 232539 s); new flavonol glycosides - kaempferol-3-O-(2"-α-L-rhamnosyl-6"-acetyl-β-D-galactopyranosido)-7-O-α-L-rhamnopyranoside, kaempferol-3-O-(6"-acetyl-β-D-galactopyranosido)-7-O-α-L-rhamnopyranoside, quercetin-3-O-(6"-acetyl-β-D-galactopyranosido)-7-O-α-L-rhamnopyranoside and their deacetylated derivatives - isolated from leaves (*Phytochemistry* 1989, *28,* 1993); 7,3',4'-trihydroxyflavone, 7,4'-dihydroxyflavone, quercetin and its 7-O-glucoside, kaempferol and its 7-O-glucoside identified in seed exudate (*Z. Naturforsch.* 1990, *45*C, 1070; *Chem. Abstr.* 1991, *114,* 39213 u); identification of endogenously occurring (S)isoleucin conjugates of (–)jasmonic acid and (+)7-isojasmonic acid as well as (S)leucine and (S)phenylalanine conjugates of (–)jasmonic acid (*Biomed. Environ. Mass Spectrom.* 1990, *19,* 327; *Chem. Abstr.* 1990, *113,* 208319 v); two new linear polyamines - PA4444 and PA44444 - isolated from mature seeds and characterised; eight more tertiary branched polyamines - PA4(4)44, PA4(4)444, PA4(4)4444, PA44(4)44, PA44(4)444, PA4(4)4(4)4, PA4(4)4(4)44 and PA4(4)44(4)4 - also isolated (*Phytochemistry* 1991, *30,* 3319); a lectin (VFL) isolated which agglutinated human and rabbit erythrocytes but not sheep erythrocytes (*Biologia* 1991, *46,* 685; *Chem. Abstr.* 1992, *116,* 148193 z); an unusual tetraamine - norspermine - isolated from seeds (*Can. J. Bot.* 1992, *70,* 1984; *Chem. Abstr.* 1993, *118,* 98056 a); 4-chlorotryptophan, 4-chloroindole-3-acetic acid and its methyl ester detected in young seeds by GC-MS (*Phytochemistry* 1992, *31,* 2327); (E)β-ocimene isolated from flowers (*Phytochemistry* 1992, *31,* 3427); isolation of procyanidins B-1, B-3 and B-4, epicatechin, epigallocatechin, gallocatechin(4α,8)epigallocatechin, gallocatechin(4α,8)catechin and gallocatechin(4α,8)epicatechin from beans (*Phytochemistry* 1993, *34,* 1255).

NEW COMPOUNDS

$$NH_2(CH_2)_3NH(CH_2)_3NH(CH_2)_3NH_2$$
Norspermine

$$NH_2(CH_2)_4NH(CH_2)_4NH(CH_2)_4NH(CH_2)_4NH_2$$
PA 4444

$$NH_2(CH_2)_4NH(CH_2)_4NH(CH_2)_4NH(CH_2)_4NH(CH_2)_4NH_2$$
PA 44444

V. hirsuta (L.) S.F. Gray (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1995, p. 254).

Detection of thermospermine and aminopropylhomospermidine in seeds (*Can. J. Bot.* 1992, *70,* 1984; *Chem. Abstr.* 1993, *118,* 98056 a).

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VICOA (Asteraceae)

V. auriculata Cass.; see *Pentanema indicum* (L.) Ling

V. indica (L.) DC.; see *Pentanema indicum* (L.) Ling

VICTORIA (Euryalaceae)

V. amazonica (Poepp.) Sow.

Eng. - Giant water-lily, Royal water-lily.

Isolation of delphinidin-3-O-(2"-O-galloyl-β-D-galactoside) and cyanidin-3-O-(2"-O-galloyl-β-D-galactoside) from leaves (*Phytochemistry* 1992, *31,* 989).

Distribution: Native of tropical South America, introduced into Indian gardens.

VIGNA (Papilionaceae)

V. angularis (Willd.) Ohwi & Ohashi syn. *Phaseolus angularis* (Willd.) W.F. Wight (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 673).

Glycerolipids such as triacylglycerol, monoglycosyldiacylglycerol, diglycosyldiacylglycerol, phosphatidylcholine, phosphatidylethanolamine and phosphatidylinositol isolated from seeds, leaves and roots (*Yakugaku* 1989, *38,* 619; *Chem. Abstr.* 1990, *112,* 18851 u); a saponin, azukisaponin I, isolated from beans along with five sterylglycosides (*Lipids* 1989, *24,* 849; *Chem. Abstr.* 1990, *112,* 73835 s); three glyceroglycolipids isolated from seeds and partially characterised; monoglycosyldiacylcerol also isolated (*Biochem. Cell Biol.* 1990, *68,* 59; *Chem. Abstr.* 1990, *113,* 20858 r); two acidic arabinogalactans - F2A and F2B - isolated from cotyledon containing arabinose, galactose and galacturonic acid in ratio of 13.1:5.9:1.0 and 3.0:2.2:2.0 respectively (*Oyo Toshitsu Kagaku* 1994, *41,* 157; *Chem. Abstr.* 1994, *121,* 153344 g).

V. mungo (L.) Hepper syn. *Phaseolus mungo* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 757).

24-Epiclerosterol, 24α- and 24β-methyl-5α-cholest-8(14)-en-3β-ols, 24α-ethyl-5α-cholest-8(14)-en-3β-ol, 14α,24α- and 14α,24β-dimethyl-5α-cholest-9(11)-en-3β-ol, 14α-methyl-24α-ethyl-5α-cholest-9(11)-en-3β-ol, 14α-methyl-24β-ethyl-5α-cholesta-9(11),25-dien-3β-ol, 24α-ethyl-5α-cholest-9(11)-en-3β-ol, 24-methylenepollinastanol and β-sitosterol isolated from seeds (*Phytochemistry* 1992, *31,* 1765).

V. radiata (L.) Wilczek var. *radiata* syn. *Phaseolus radiatus* L., *P. aureus* Roxb., *P. radiatus* L. var. *aureus* (Roxb.) Prain, *P. mungo* auct. (non L.) (*Compend. Indian Med. Plants,* Vc Rastogi & Mehrotra, PID, New Delhi, 1995, p. 757).

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(+)Abscisic acid synthesised (*Helv. Chim. Acta* 1989, *72,* 361); isolation of triacontanol, vitexin, stigmasterol and β-sitosterol from seeds (*Yakhak Hoechi* 1990, *34,* 282; *Chem. Abstr.* 1991, *115,* 155072 s).

BIOLOGICAL ACTIVITY

Effects of formononetin and daidzein on immune system of normal Swiss mice studied by administration of 20.0 mg/kg, intragastric doses daily for 7 days. They increased thymus weight, phagocytic activity of peritoneal macrophages, haemolytic ability of plaque forming cells and number of mature T lymphocytes in peripheral blood (*Nanjing Nongye Daxue Xuebao* 1993, *16,* 64; *Chem. Abstr.* 1994, *120,* 69028 d).

VINCA (Apocynaceae)

V. rosea L.; see *Catharanthus roseus* (L.) G.Don

VINCETOXICUM (Asclepiadaceae)

V. album (Mill.) Aschers syn. *Cynanchum vincetoxicum* Pers. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 675).

Alkaloids inhibited growth of hormone-independent mammary carcinoma cells MDA-MB 231 (*Arch. Pharm.* 1993, *326,* 67; *Chem. Abstr.* 1993, *118,* 182901 e).

VIOLA (Violaceae)

V. odorata L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 430).

Isolation of dodecan-1-ol, pentadeca-5,10-dien-1-ol, pentadec-5-en-1-ol, octadec-1-ene, eicos-1-ene and octadeca-9,12-dienoic acid from leaves (*Phytochemistry* 1992, *31,* 571).

VIRGILIA (Papilionaceae)

V. capensis Lamk.; see *V. oroboides* (Berg.) Salter

V. oroboides (Berg.) Salter syn. *V. capensis* Lamk. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 676).

Heartwood yielded 3-hydroxy-8,9-methylenedioxypterocarp-6a-ene, (2R,3R)3,7-dihydroxyflavanone and (αR)4-methoxy-α,2',4'-trihydroxydihydrochalcone (*Phytochemistry* 1990, *29,* 3307).

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VISCUM (Loranthaceae)

V. album L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 676).

Two dimensional isolectin patterns described for lectins MLI, MLII and MLIII (*Naturwiss.* 1992, *79,* 80; *Chem. Abstr.* 1992, *116,* 231919 m).

VITEX (Verbenaceae)

V. agnus-castus L. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1990, p. 431).

Agnuside and aucubin isolated from leaves (*Farm. Glas.* 1992, *48,* 305; *Chem. Abstr.* 1993, *119,* 68041 v).

V. leucoxylon L.f. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 256).

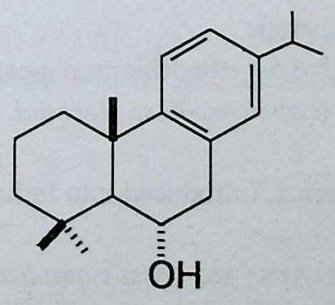
Flavonoid fraction showed anti-inflammatory activity against acute inflammation in rats. Stem bark extract did not affected wound healing except that it significantly decreased wound breaking strength in incision wound in rats (*Fitoterapia* 1990, *61,* 263).

V. negundo L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 759).

Purified fraction of leaf oil showed repellent activity against *Aedes aegypti*, giving protection from mosquito bites for 1-3 hr (*Indian J. Med. Res.* 1992, *95,* 200).

Isolation and structure determination of a new diterpene - 5β-hydro-8,11,13-abietatrien-6α-ol (I); lanostan-8,25-dien-3β-ol and artemetin also isolated (*Indian J. Chem.* 1991, *30*B, 773); a new lignan isolated from seeds and characterised as 6-hydroxy-4-(4-hydroxy-3-methoxyphenyl)-3-hydroxymethyl-7-methoxy-3,4-dihydro-2-naphthaldehyde (*Phytochemistry* 1992, *31,* 4378).

NEW COMPOUNDS



I

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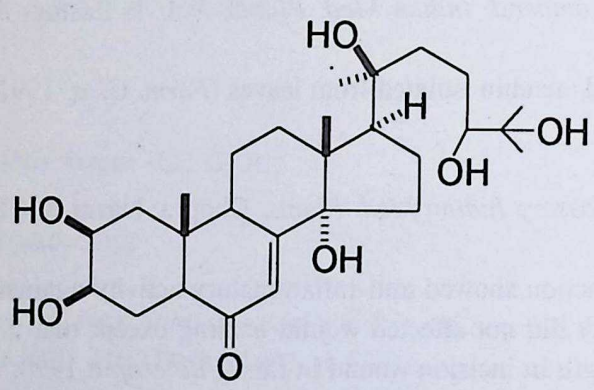
BIOLOGICAL ACTIVITY

Diterpene (I) and artemetin (50.0 mg/kg, p.o.) inhibited male rat paw oedema induced by carrageenin by 18.1 and 32.4% respectively (*Indian J. Chem.* 1991, *30*B, 773).

V. pinnata L. syn. *V. pubescens* Vahl (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 257).

A new ecdysteroid - pinnatasterone - isolated from bark along with 20-hydroxyecdysone and turkesterone and its structure elucidated (*Phytochemistry* 1993, *32,* 303).

NEW COMPOUNDS



Pinnatasterone

V. pubescens Vahl; see *V. pinnata* L.

V. trifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 759).

Identification of 1,8-cineole, terpinyl acetate caryophyllene, sabinene and α-pinene in oil (*Flavour Fragrance J.* 1991, *6,* 97; *Chem. Abstr.* 1991, *115,* 155025 d).

VITIS (Vitaceae)

V. labrusca L.

Eng. - Banglore blue, Fox grape.

3-Methylthiopropanal, ethyl 3-methylthiopropanoate and ethyl 2-mercaptopropanoate detected by MS in grape essence (*Labensm.-Wiss. Technol.* 1990, *23,* 94; *Chem. Abstr.* 1990, *113,* 22362 y).

Distribution: Native of North America, introduced into India.

V. quadrangularis Wall. ex Wt. & Arn.; see *Cissus quadrangularis* L.

V. vinifera L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 760).

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Acuminoside (geranyl-6-O-β-D-apiofuranosyl-β-D-glucopyranoside) isolated (*J. Agric. Food Chem.* 1990, *38,* 1373; *Chem. Abstr.* 1990, *113,* 3244 v); isolation of isoquercitrin and quercetin-3-glucuronoside from leaves of red grape (*Pharm. Acta Helv.* 1990, *65,* 127; *Chem. Abstr.* 1990, *113,* 74903 v); peonidin-3-monoglucoside, peonidin-3,5-diglucoside, petunidin-3-monoglucoside, delphinidin-3-monoglucoside along with malvidin-3-monoglucoside, malvidin-3,5-diglucoside and their respective derivatives acylated with p-coumaric acid isolated from Muscat Bailey A grape skins (*J. Ferment. Bioeng.* 1990, *69,* 328; *Chem. Abstr.* 1990, *113,* 94815 w); isolation of catechol, epicatechol, gallocatechol, caffeyltartaric acid, coumaryltartaric acid and caffeic acid from leaves of red grape (*Plant. Med. Phytother.* 1990, *24,* 179; *Chem. Abstr.* 1991, *114,* 108763 n); procyanidin dimers B1, B2, B3, B4, B5, B6, B7 and B8 isolated from seeds; four procyanidin trimers characterised as epicatechin(4β→6)epicatechin(4β→8)epicatechin, epicatechin(4β→8)epicatechin - (4β→6)catechin, epicatechin(4β→8)epicatechin(4β→6)epicatechin and epicatechin(4β→6)-epicatechin(4β→8)catechin also isolated; further procyanidins-B1 3-O-gallate, B2 3-O-gallate, B2 3'-O-gallate, B4 3'-O-gallate, B2 3,3'-di-O-gallate and epicatechin(4β→8)epicatechin-3-O-gallate(4β→8)catechin - along with (+)catechin, (–)epicatechin and (–)epicatechin-3-O-gallate also obtained (*Phytochemistry* 1991, *30,* 1259); zeatin, zeatin riboside, dihydrozeatin, N^6-isopentenyladenine and its riboside identified in xylem sap (*Dokl. Bulg. Akad. Nauk* 1992, *45,* 79; *Chem. Abstr.* 1993, *118,* 209426 t).

VOLUTARELLA (Asteraceae)

V. divaricata Benth. & Hook.f.; see *Amberboa ramosa* (Roxb.) Jafri

WALTHERIA (Sterculiaceae)

W. americana L.; see *W. indica* L.

W. indica L. syn. *W. americana* L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 762).

Isolation of kaempferol, its 3-O-β-D-galactoside, herbacetin, gossypetin and their 8-O-β-D-glucuronides, 2"-O-β-D-glucosylvitexin and caffeic acid from aerial parts (*Fitoterapia* 1990, *61,* 371).

WEDELIA (Asteraceae)

W. biflora (L.) DC.

Beng. - Sonki.

Veratrylidenehydrazide, 3,3'-di-O-methylquercetin, 2,7-dihydroxy-3-(3'-methoxy-4'-hydroxy)-5-methoxyisoflavone (I) and 7,3'-di-O-methylquercetin isolated from leaves (*Phytochemistry* 1993, *32,* 1427).

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Distribution: Coastal regions of Bengal, Madras and Bombay to Kerala.

BIOLOGICAL ACTIVITY

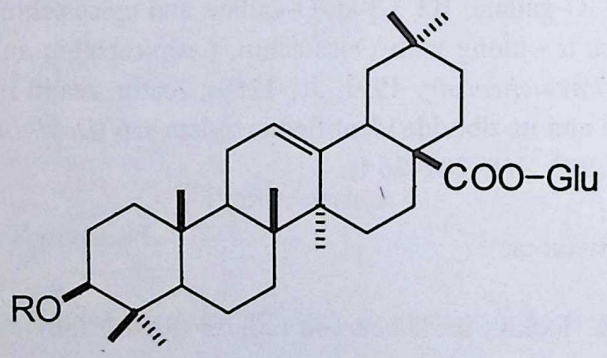
7,3'-Di-O-methylquercetin showed antifungal and boll weevil antifeedant activity whereas 3,3'-di-O-methylquercetin showed only antifeedant activity and isoflavone (I) exhibited only antifungal activity (*Phytochemistry* 1993, *32,* 1427).

W. calendulacea Less.; see *W. chinensis* (Osbeck) Merr.

W. chinensis (Osbeck) Merr. syn. *W. calendulacea* Less. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 764).

A new bisdesmosidic saponin (I) isolated from fresh leaves and characterised as β-D-glucopyranosyl 3-O-β-D-xylopyranosyl(1→2)-β-D-glucuronopyranosyl-olean-12-en-28-oate; ginsenoside Ro also obtained (*Indian J. Chem.* 1991, *30*B, 466).

NEW COMPOUNDS



I

R = Gluc.acid(2→1)Xyl

W. trilobata (L.) A.S. Hitchc. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 679).

α-Phellandrene (17.4) and limonene (16.3%) determined in oil (*J. Essent. Oil Res.* 1993, *5,* 439; *Chem. Abstr.* 1994, *121,* 129877 n).

WIKSTROEMIA (Thymelaeaceae)

W. canescens Meissn. syn. *W. chamaedaphne* Meissn. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 680).

Two wikstroemia factors C_1 and C_2 isolated from roots and identified as phorbol-13-(3E,5E-decadienoate) and phorbol-12-benzoate-13-decanoate respectively (*Phytother. Res.* 1993, *7,* 194; *Chem. Abstr.* 1993, *119,* 135605 x).

BIOLOGICAL ACTIVITY

Phorbol-13-(3E,5E-decadienoate) showed irritant activity on mouse ear, comparable

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to that of standard irritant phorbol ester, 12-O-tetradecanoylphorbol-13-acetate (*Phytother. Res.* 1993, *7,* 194; *Chem. Abstr.* 1993, *119,* 135605 x).

W. chamaedaphne Meissn.; see *W. canescens* Meissn.

WISTERIA (Papilionaceae)

W. sinensis Sweet (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 681).

Identification of ethyl acetate, oct-1-en-3-ol, benzaldehyde, linalool, benzyl alcohol, 2-phenylethanol, 6-ethyltetrahydro-2H-pyran-3-ol, 2,3-dihydrobenzofuran, 2-aminobenzoic acid, methyl benzoate, α-farnesene, isoeugenol, methyl hexadecanoate, ethyl palmitate, heneicosane, octadecanoic acid and tricosane in fresh flowers by GC-MS (*Lanzhou Daxue Xuebao Ziran Kexueban* 1992, *28,* 69; *Chem. Abstr.* 1994, *120,* 319433 s).

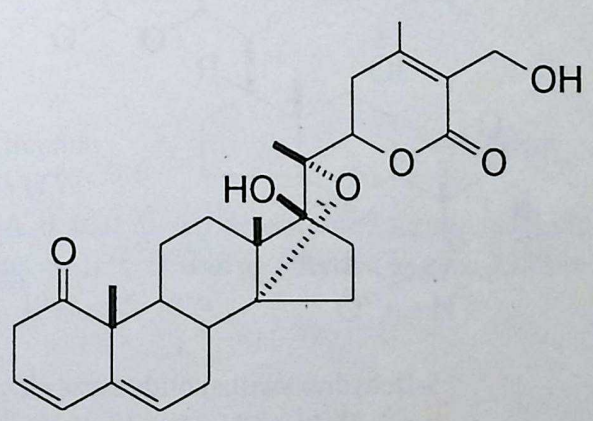
WITHANIA (Solanaceae)

W. coagulans (Stocks) Dunal (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 765).

Hexane, ethanol and aqueous extracts showed antibacterial activity (*Fitoterapia* 1993, *64,* 367).

A new withanolide - coagulin - isolated and characterised as 17β,27-dihydroxy-14,20-epoxide-1-oxo-22(R)-witha-3,5,24-trienolide (*J. Nat. Prod.* 1993, *56,* 1000).

NEW COMPOUNDS



Coagulin

W. somnifera (L.) Dunal (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 765).

Root extract (5.0 μg) inhibited specific binding of [3H]GABA to its putative receptor sites 20.0%, whereas at 1.0 mg, it produced 100% inhibition. Extract (100.0 μg) produced

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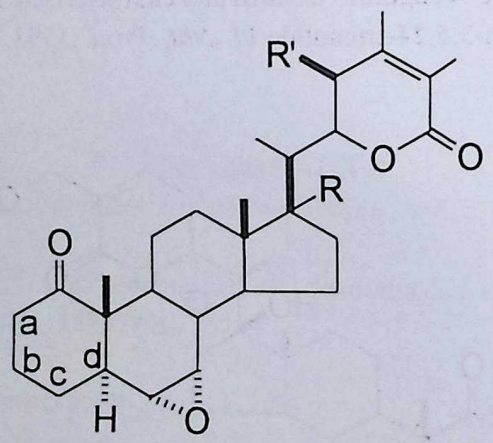
91.0% enhancement of [3H]flunitrazepam binding. It also increased ^{36}Cl-influx in absence of GABA and this effect was blocked by bicuculline and picrotoxin and enhanced by diazepam. These results suggest that root extract contains an ingredient which has GABA mimetic activity (*Indian J. Med. Res.* 1991, *94,* 312); methanolic fraction of plant extract (76.4 mg/kg, i.p.) showed anti-inflammatory activity comparable to that of hydrocortisone sodium succinate (5.0 mg/kg). Activity attributed to biologically-active steroids, of which withaferin A is known as major component (*J. Ethnopharmacol.* 1992, *37,* 113).

Two new withanolides - 5-dehydroxywithanolide R and withasomniferin A - isolated and their structures established (*Phytochemistry* 1991, *30,* 3824); isolation of two new withanolides - sominone and sominolide - and their characterisation as 1α,3β,27-trihydroxy-22(R)witha-5,24-dienolide and 4β,27-dihydroxy-14α,15α-epoxy-1-oxo-22(R)-witha-2,24-dienolide respectively (*Heterocycles* 1992, *34,* 689). NMR spectra of (+)withalactone (*Adv. Nat. Prod. Chem., Proc.-Int. Symp. Pak.*-US *Binatl. Workshop* 5th 1992, 463; *Chem. Abstr.* 1994, *120,* 50128 q); a new chlorinated withanolide - withanolide C - isolated and its structure elucidated (*Phytochemistry* 1992, *31,* 3648); withasomidienone isolated and characterised as 27-hydroxy-3-oxo-22(R)-witha-1,4,24-trienolide (*J. Nat. Prod.* 1993, *56,* 1000); determination of linoleic (47.30), oleic (30.73), palmitic (20.35), stearic (1.11) and myristic (0.14%) acids in seed oil (11.4%) (*Sci. Phys. Sci.* 1993, *5,* 81; *Chem. Abstr.* 1993, *119,* 233795 d); linoleic (60.08), palmitic (20.07), oleic (18.53), stearic (0.69) and myristic (0.10%) acids determined in seed oil (10.1%) by GLC (*Asian J. Chem.* 1994, *6,* 442; *Chem. Abstr.* 1994, *120,* 265845 g).

NEW COMPOUNDS



5-Dehydroxywithanolide R
R = α-H, R' = OH, ab = Δ
Withasomniferin A
R = β-OH, R' = H, cd = Δ

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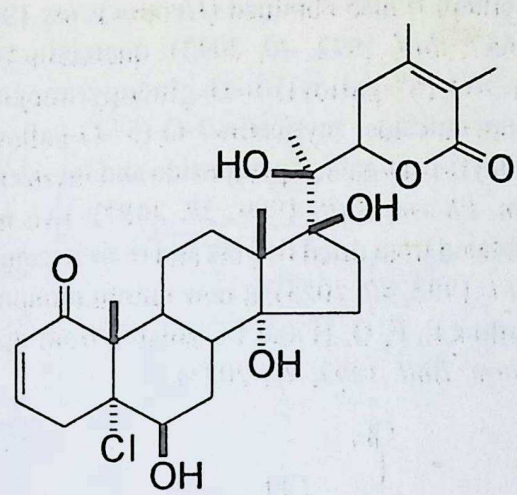
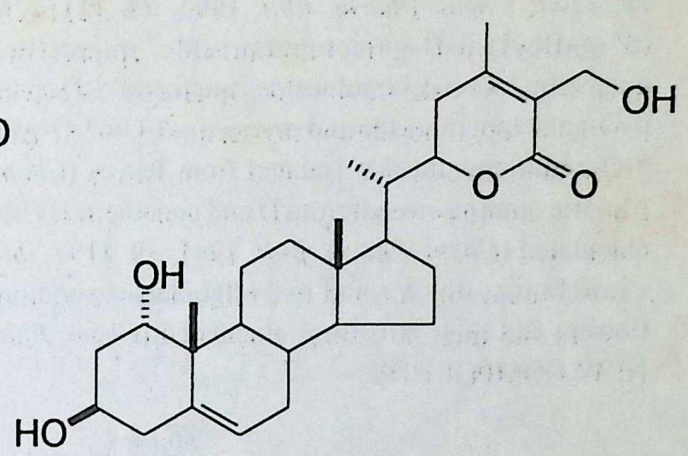
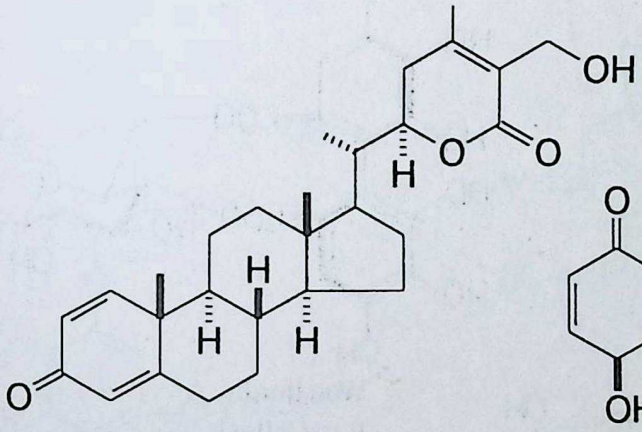


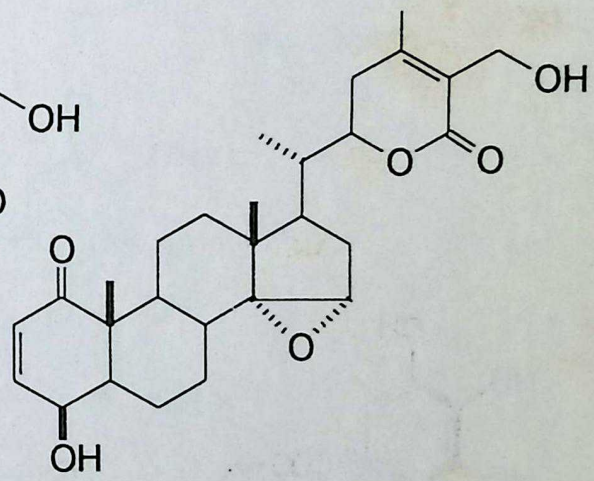
Withanolide C



Sominone



Withasomidienone



Sominolide

BIOLOGICAL ACTIVITY

Withaferin A at 10.0 mg/kg dose showed significantly protective effect against CCl_4-induced hepatotoxicity in rats. It was as effective as hydrocortisone dose for dose (*Indian J. Physiol. Pharmacol.* 1992, *36,* 127).

WOODFORDIA (Lythraceae)

W. floribunda Salisb.; see *W. fruticosa* (L.) Kurz

W. fruticosa (L.) Kurz syn. *W. floribunda* Salisb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 766).

Three new dimeric hydrolyzable tannins - woodfordins A, B and C - isolated from

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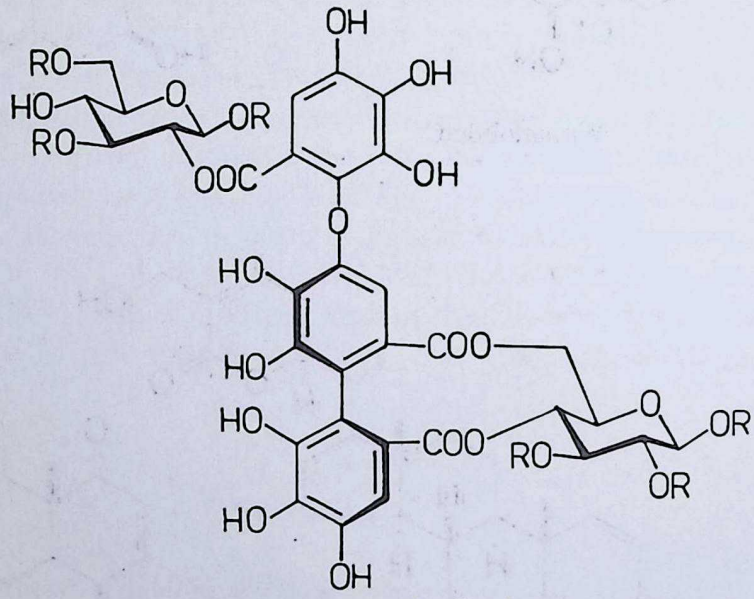
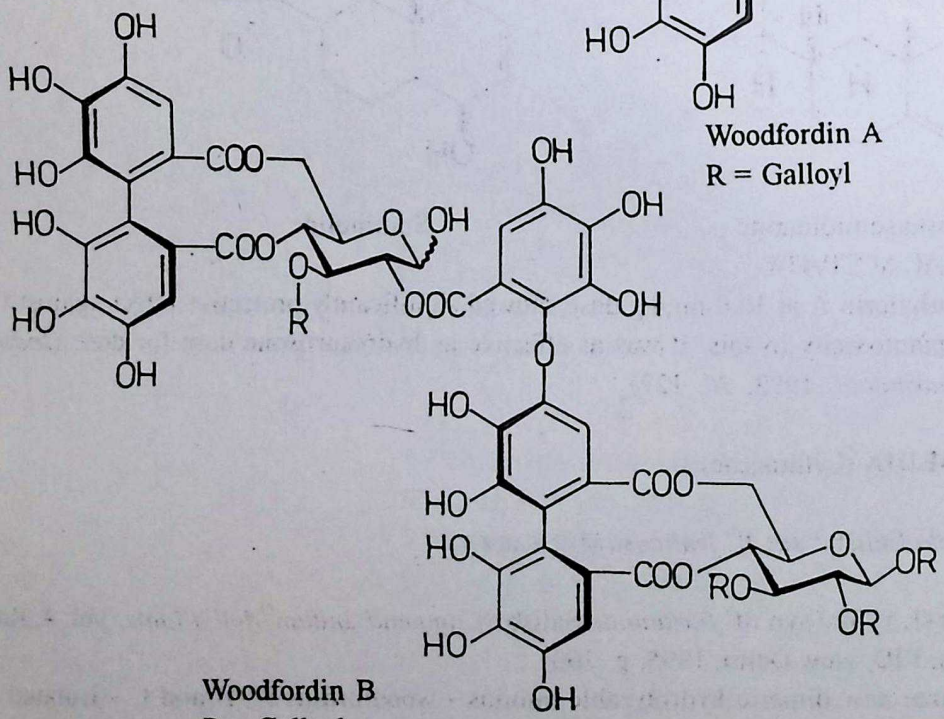
dried flowers and their structures established; oenothein B also obtained (*Heterocycles* 1989, *29*, 2267; *Chem. Pharm. Bull.* 1990, *38*, 1211, 2687; *ibid.* 1992, *40*, 2023). quercetin-3-O-(6"-galloyl)-β-D-galactopyranoside, quercetin-3-O-(6"-galloyl)-β-D-glucopyranoside, quercetin-3-O-α-L-arabinoside, quercetin-3-O-xylopyranoside, myricetin-3-O-(6"-O-galloyl)-β-D-galactopyranoside and myricetin-3-O-6"-O-galloyl)-β-D-galactopyranoside and myricetin-3-O-arabinopyranoside isolated from leaves (*Chem. Pharm. Bull.* 1990, *38*, 2687); two new trimeric tannins - woodfordin D and oenothein A - isolated from dried flowers and their structures elucidated (*Chem. Pharm. Bull.* 1991, *39*, 1157; *ibid.* 1992, *40*, 2023); a new tannin monomer - isoschimawalin A - and five oligomers - woodfordins E, F, G, H and I - isolated from dried flowers and their structures elucidated (*Chem. Pharm. Bull.* 1992, *40*, 2023).

NEW COMPOUNDS



Woodfordin A
R = Galloyl



Woodfordin B
R = Galloyl

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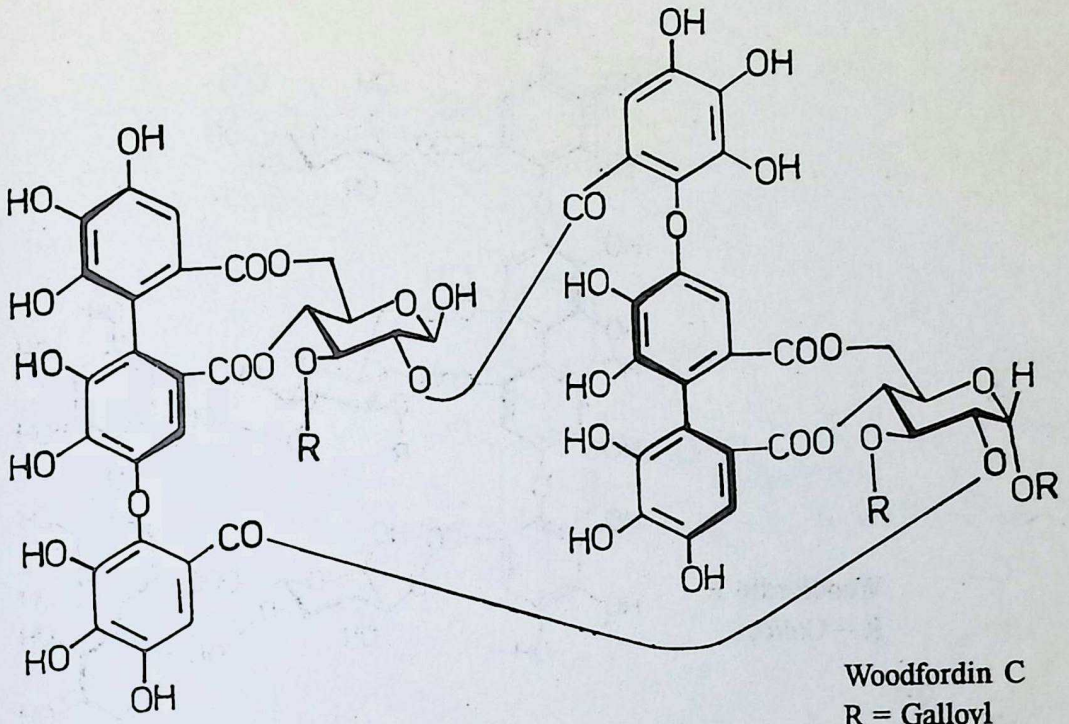
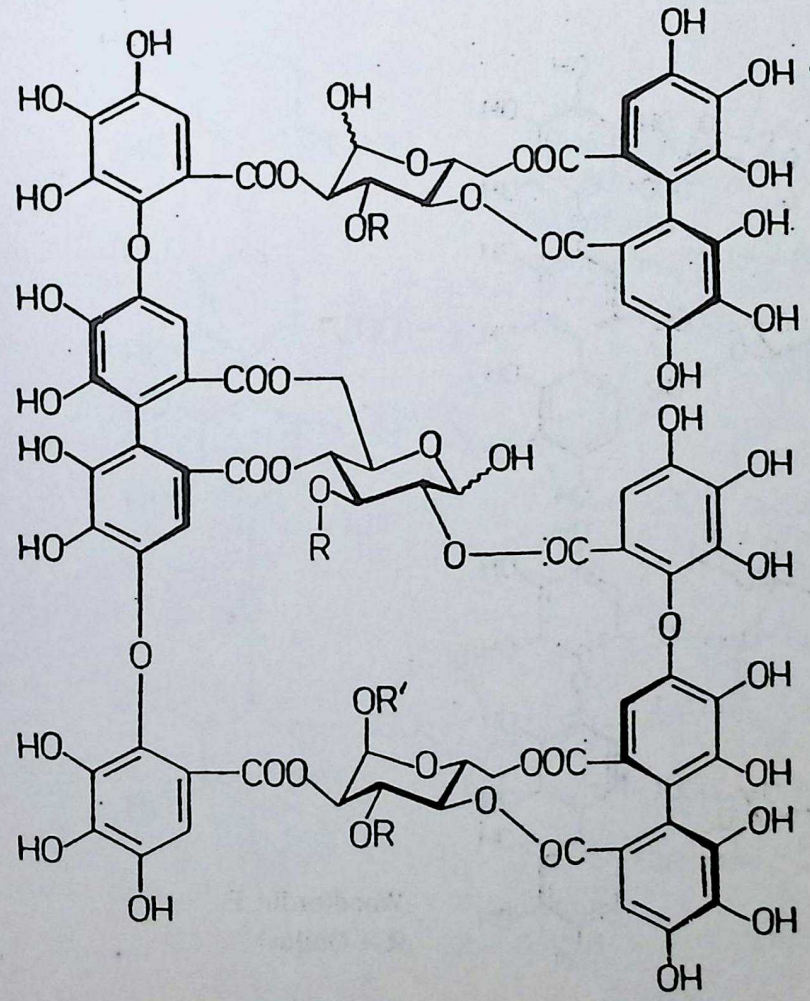


Woodfordin C
R = Galloyl



Woodfordin D
R,R' = Galloyl
Oenothein A
R = Galloyl, R' = H

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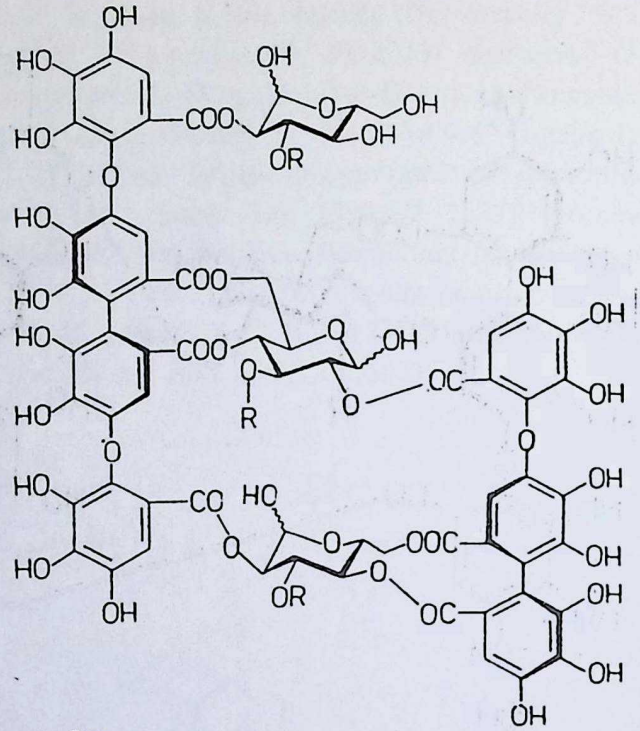
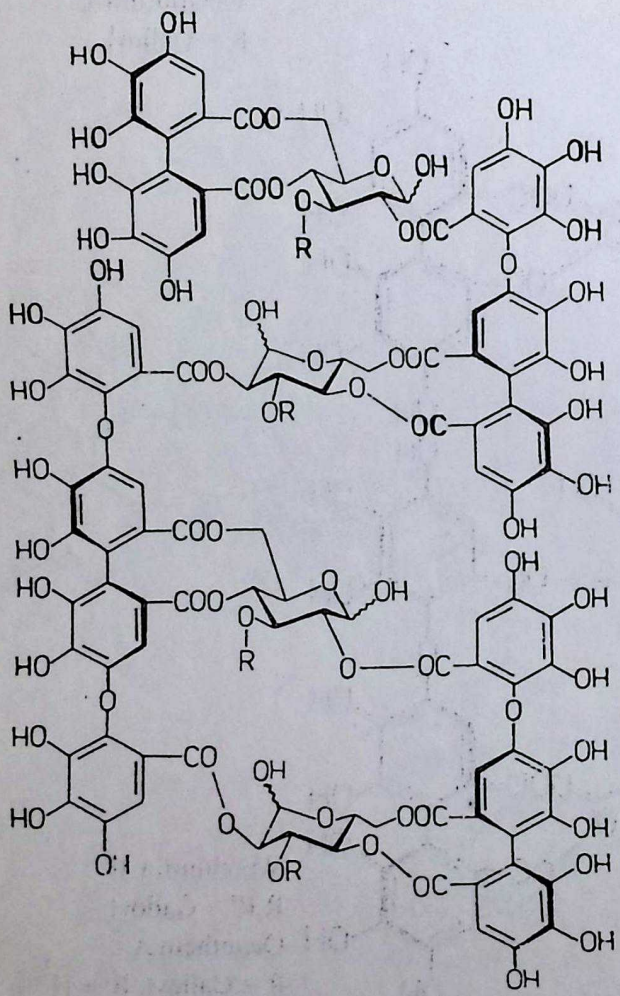


Woodfordin E
R = Galloyl



Woodfordin F
R = Galloyl

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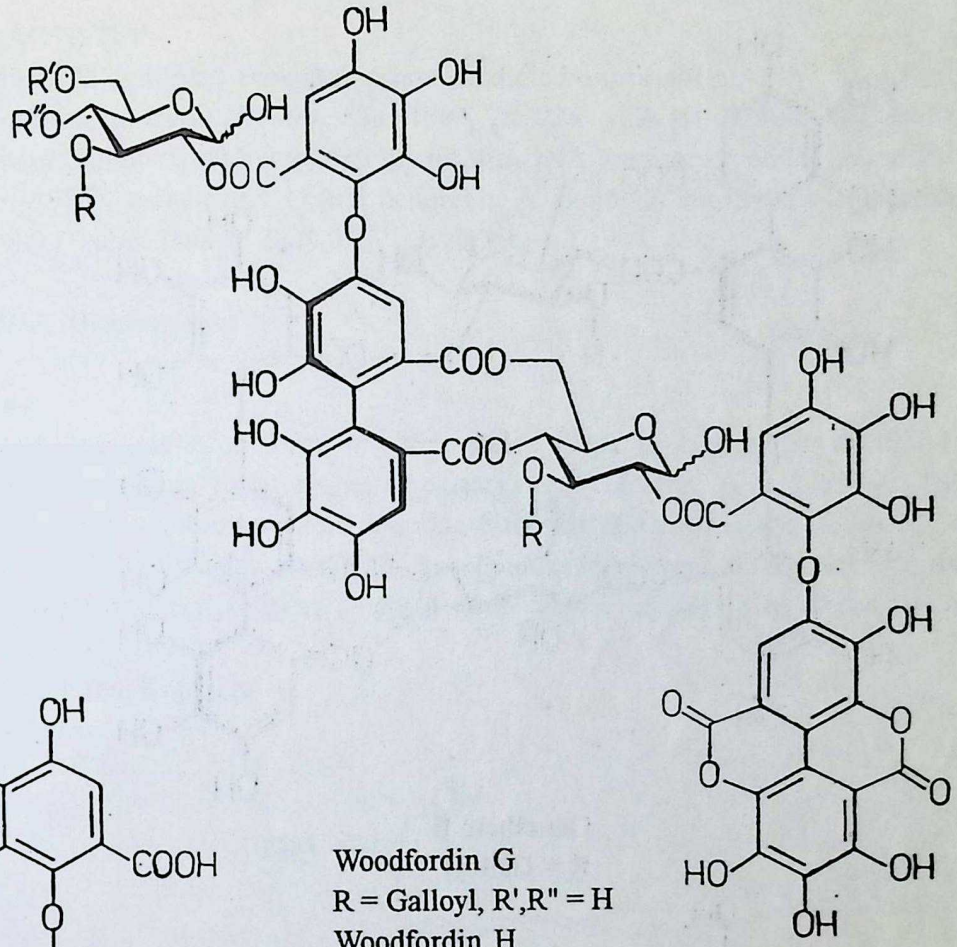
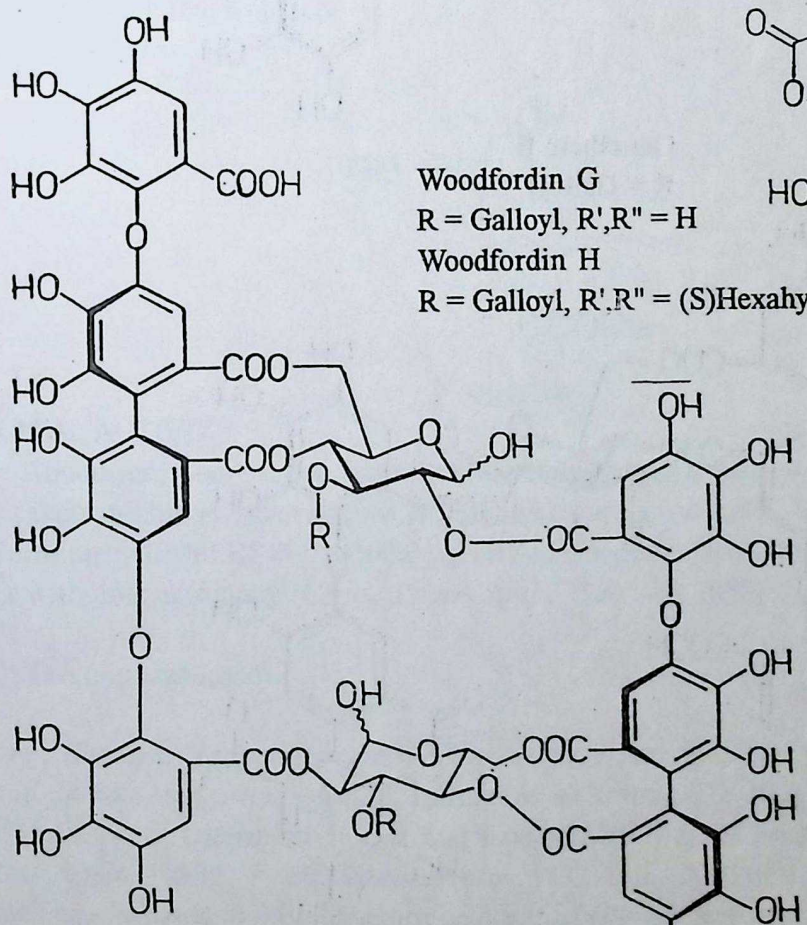


Woodfordin G
R = Galloyl, R',R" = H
Woodfordin H
R = Galloyl, R',R" = (S)Hexahydroxydiphenoyl



Woodfordin I
R = Galloyl

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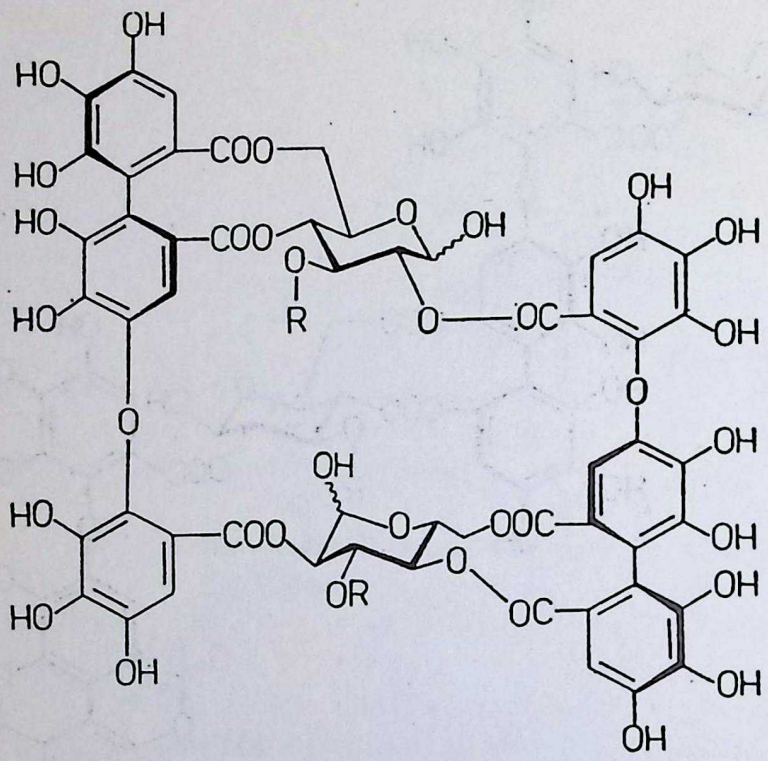
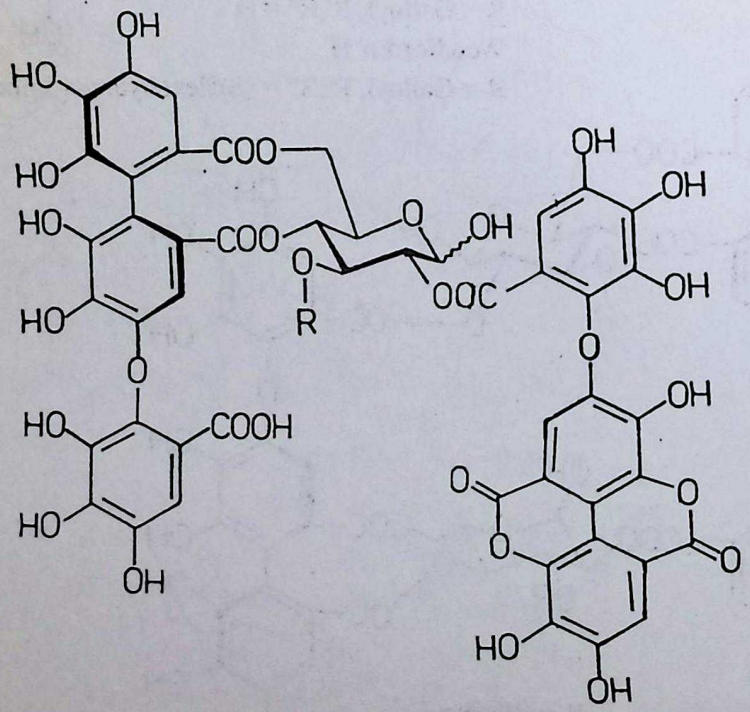


Oenothein B
R = Galloyl



Isoschimawalin A
R = Galloyl

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BIOLOGICAL ACTIVITY

Oenothein B exhibited remarkable host-mediated antitumor activity; woodfordin C also showed antitumor activity (*Heterocycles* 1989, *29,* 2267; *Chem. Pharm. Bull.* 1990, *38,* 1211); woodfordin C showed inhibitory activity toward DNA topoisomerase II (*Chem. Pharm. Bull.* 1990, *38,* 2687); woodfordin D and oenothein A exhibited significant host-mediated antitumor activity (*Chem. Pharm. Bull.* 1991, *39,* 1157).

WOODWARDIA (Blechnaceae)

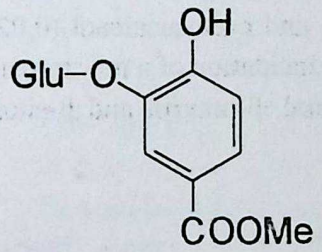
W. orientalis Sw.

Hot aqueous extract of rhizomes *in vitro* reduced plaque forming ability of HSV-1 and poliovirus type-1 more strongly than methanol extract (*Chem. Pharm. Bull.* 1993, *41,* 1803).

Blechnic acid, 7-epiblechnic acid, 8-epiblechnic acid and brainic acid isolated (*Chem. Pharm. Bull.* 1992, *40,* 2099); a new glucoside - woodorien - isolated and its structure elucidated; ponasterone, pterosterone, ecdysterone, (–)epicatechin and (+)catechin also isolated (*Chem. Pharm. Bull.* 1993, *41,* 1803).

Distribution: Himalayas, Kumaon.

NEW COMPOUNDS



Woodorien

BIOLOGICAL ACTIVITY

Woodorien, ponasterone, pterosterone, ecdysterone, (–)epicatechin and (+)catechin tested for their inhibitory effect against HSV-1 infection on vero cells. All compounds reduced plaque forming ability of HSV-1 at 100.0 μg/ml and woodorien was found to be the most potent inhibitor with no cytotoxicity (*Chem. Pharm. Bull.* 1993, *41,* 1803).

WRIGHTIA (Apocynaceae)

W. arborea (Dennst.) Mabberley syn. *W. tomentosa* Roem. & Schult., *W. mollissima* Wall. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 684).

Isolation of tritriacont-16-one and hexacosan-3,6-diol-12-oic acid from stem bark (*Orient. J. Chem.* 1992, *8,* 69; *Chem. Abstr.* 1992, *116,* 200941 h); a new isoflavone - wrightiadione - isolated and its structure determined (*Phytochemistry* 1992, *31,* 4333).

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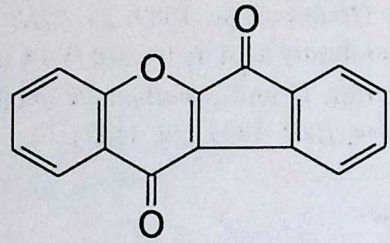


Wrightiadione

BIOLOGICAL ACTIVITY

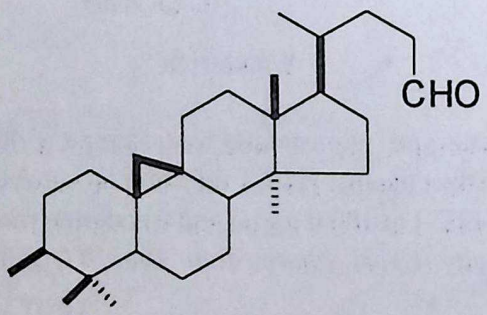
Wrightiadione exhibited cytotoxicity against murine P388 lymphocytic leukaemia cell line (ED50 1.1 μg/ml) (*Phytochemistry* 1992, *31,* 4333).

W. mollissima Wall.; see *W. arborea* (Dennst.) Mabberley

W. tinctoria R.Br. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 766).

α-Amyrin (1.0), β-amyrin (0.25), β-sitosterol (0.25), oleanolic acid (0.1), ursolic acid (0.1), cycloartenone (0.025) and cycloeucalenol (0.02%) determined (*Fitoterapia* 1992, *63,* 554); isolation and structure elucidation of a new terpene - wrightial - from immature seed pods; cycloartenone, cycloeucalenol, β-amyrin and β-sitosterol also obtained (*J. Nat. Prod.* 1993, *56,* 1811).

NEW COMPOUNDS



Wrightial

W. tomentosa Roem. & Schult.; see *W. arborea* (Dennst.) Mabberley

XANTHIUM (Asteraceae)

X. pungens Wallroth

Two toxic kaurene glycosides (I and II) isolated and their structures determined (*J. Nat. Prod.* 1990, *53,* 451); isolation and structure elucidation of a new pentacyclic lactone -

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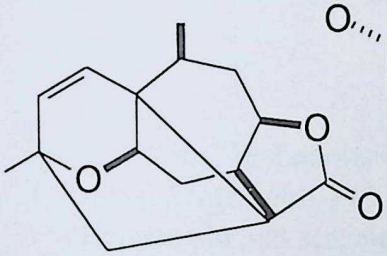
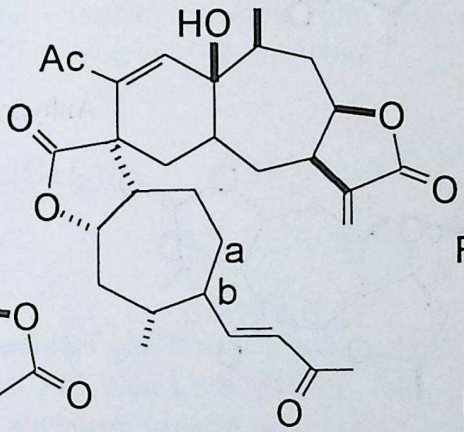
xanthipungolide; two dimeric lactones - pungiolides A and B; two xanthanolides - 2-acetoxy-4,5-epoxyxanthanolide-1,4-endoperoxide (III) and 1β,5β-epoxy-11α,13-dihydrotomentosin (IV); and a pseudoguaiane - 4β-hydroxypseudoguai-11(13)-en-12-oic acid (V) - from aerial parts of Egyptian plant; 8-epixanthatin, loliolide, 1β,6α-dihydroxyeudesm-4(15)-ene, vomifoliol and 6-acetyl-2,2-dimethylchromene also isolated (*Phytochemistry* 1990, *29,* 2211); 4,5-dihydrovomifoliol isolated and its structure determined (*Pharmazie* 1990, *45,* 698; *Chem. Abstr.* 1991, *114,* 39217 y).

Distribution: Karnataka and Maharashtra, in plains.

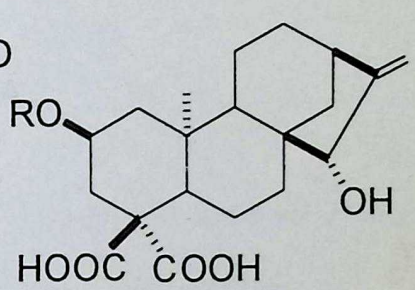
NEW COMPOUNDS



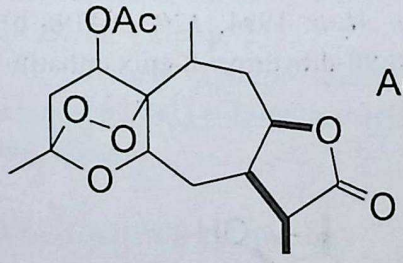
Xanthipungolide



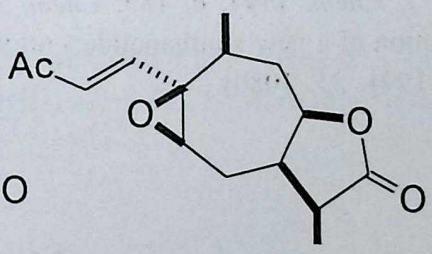
Pungiolide A
ab = △
Pungiolide B
ab = Epoxy



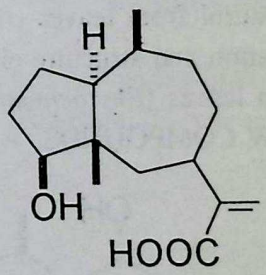
I
R = Glu(2-isovaleryl)
II
R = Glu(2β-methylvaleryl)



III



IV



V

X. spinosum L. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 685).

A new xanthanolide (I) isolated and characterised as 2-oxo-4-O-acetyldesacetyl-xanthanol (*Phytochemistry* 1991, *30,* 3461); two new xanthanolides - anhydrodehydroivalbin and cyclospinosolide - isolated from aerial parts and their structures determined; sesamin,

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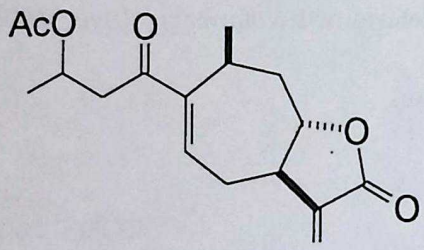
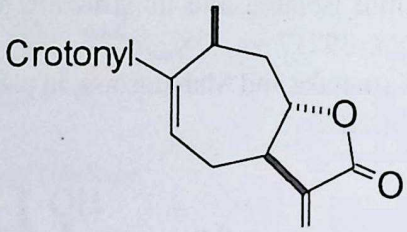
coniferyl alcohol, xanthatin, xanthanol and isoxanthanol also obtained; absolute configuration of xanthanol and isoxanthanol and their C-4 epimers established (*Phytochemistry* 1993, *34*, 1569).

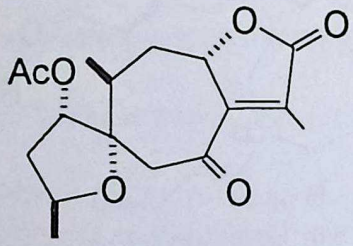
NEW COMPOUNDS



I



Anhydrodehydroivalbin

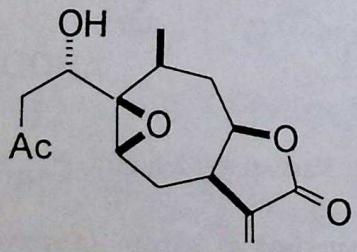


Cyclospinosolide

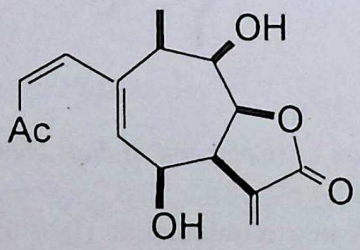
X. strumarium L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 767).

A new sesquiterpene lactone - 2-hydroxytomentosin-1β,5β-epoxide - isolated and its structure elucidated (*Phytochemistry* 1993, *32,* 206); a new polyphenol isolated from fruits and characterised as 1,3,5-tri-O-caffeoylquinic acid along with 3,5-di-O-caffeoylquinic acid (*Phytochemistry* 1993, *32,* 508); isolation of β-amyrin, octacosanol, stigmasterol and β-sitosterol from leaves (*Asian J. Chem.* 1994, *6,* 189; *Chem. Abstr.* 1994, *120,* 294196 b); isolation and structure elucidation of a new xanthanolide - 6β,9β-dihydroxy-8-epixanthatin - from leaves (*Phytochemistry* 1994, *35,* 1080).

NEW COMPOUNDS



2-Hydroxytomentosin-1β,5β-epoxide



6β,9β-Dihydroxy-8-epixanthatin

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XEROMPHIS (Rubiaceae)

X. spinosa (Thunb.) Keay syn. *Randia dumetorum* Lamk., *R. longispina* Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 767).

Crude saponin fraction showed haemolytic, molluscicidal and immunostimulating activities (*Planta Med.* 1990, *56,* 451).

Two new triterpene saponins isolated from fruits and characterised as 3-O-[β-D-glucosyl(1→4)-β-D-glucosyl(1→3)-β-D-glucuronosyl]oleanolic acid and 3-O-[β-D-glucosyl(1→6)-β-D-glucosyl(1→3)-β-D-glucuronosyl)oleanolic acid (*Planta Med.* 1990, *56,* 451); a new aliphatic diol - randiol - isolated from bark and its structure established as tetratriaconta-12,21-diol (*Fitoterapia* 1991, *62,* 506).

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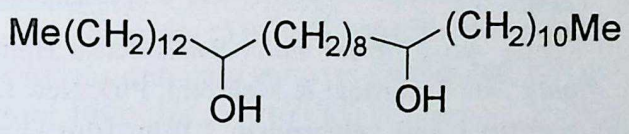

Randiol

X. uliginosa (Retz.) Maheshwari syn. *Randia uliginosa* DC. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 768).

Hymexelsin and scopoletin isolated from bark (*Fitoterapia* 1992, *63,* 378).

BIOLOGICAL ACTIVITY

Hymexelsin showed insect antifeedant activity towards *Spodaptera litura* 4th instar (*Fitoterapia* 1992, *63,* 378).

XIMENIA (Olacaceae)

X. americana L. var. *americana* (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 259).

A new saponin isolated from roots and characterised as oleanolic acid-3-O-α-L-rhamnosyl(1→2)-β-D-galactosyl(1→3)-β-D-glucuronosyl-28-O-β-D-glucoside (*Fitoterapia* 1994, *65,* 59).

XYLOCARPUS (Meliaceae)

X. granatum Koen. syn. *Carapa granatum* (Koen.) Alston, *C. moluccensis* auct. (non Lamk.) p.p. , *C. obovata* Blume (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 712).

Two new limonoids - xyloccensin I and xyloccensin J - isolated from fruit kernels of Fijian plant and their structures determined; NMR spectral data of xyloccensin F and swietenine (*Tetrahedron* 1991, *47,* 8943).

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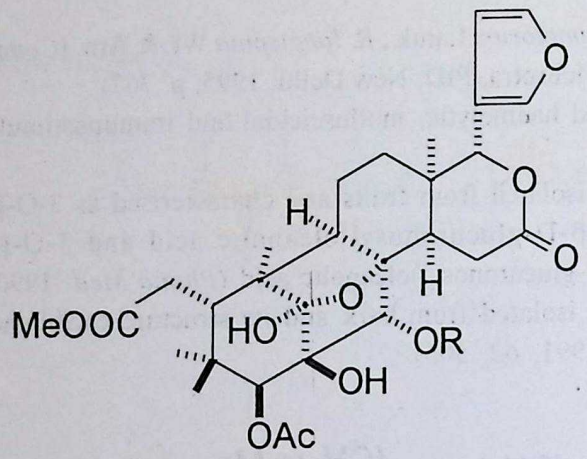


Xyloccensin I
R = 2-Me Butyryl
Xyloccensin J
R = Isobutyryl

X. moluccensis (Lamk.) Roem. syn. *Carapa moluccensis* sensu Hiern (non Lamk.) p.p. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 686).

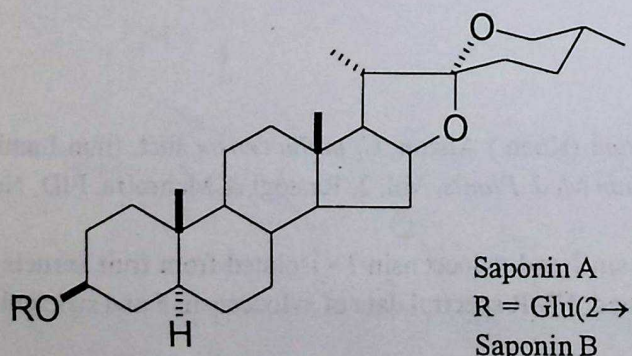
Isolation of xyloccensin I and xyloccensin J from fruit kernels of Fijian plant (*Tetrahedron* 1991, *47,* 8943).

YUCCA (Liliaceae)

Y. aloifolia L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 770).

Two spirostanol saponins - saponin A and saponin B - isolated from rhizomes and their structures determined (*Phytochemistry* 1990, *29,* 342); a new molluscicidal spirostanol glycoside isolated from inflorescence and characterised as 3-O[α-L-rhamnosyl(1→3)α-L-arabinosyl(1→3)β-D-glucopyranosyl]-25(R)-5α-spirostan-2α,3β-diol (*J. Nat. Prod.* 1990, *53,* 1557); isolation of a new gitogenin from rhizomes and its structure elucidation as 3-O-[β-D-xylosyl(1→3)-β-D-glucosyl(1→3)β-D-xylosyl(1→3)-β-D-glucosyl(1→3)-β-D-glucopyranosyl]-25(R)-5α-spirostan-2α,3β-diol (*J. Nat. Prod.* 1991, *54,* 863).

NEW COMPOUNDS



Saponin A
R = Glu(2→1)Glu
Saponin B
R = Glu(3→1)Glu(2→1)Xyl(2→1)Glu(3→1)Xyl

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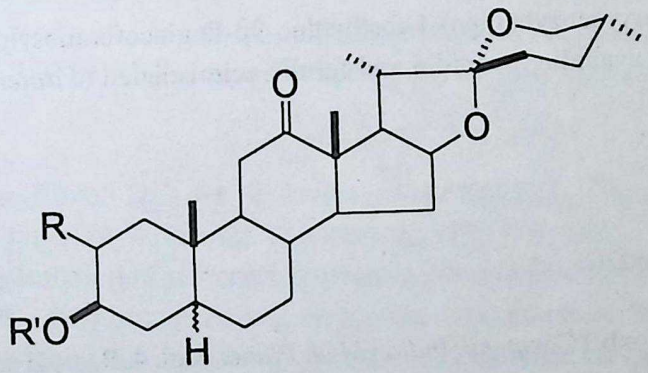
Y. gloriosa L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 770).

Eight new steroidal glycosides - YS-VI, YS-VII, YS-VIII, YS-IX, YS-X, YS-XI, YS-XII and YS-XIII - isolated from caudex and characterised as mexogenin-3-O-β-D-glucosyl(1→2)-β-D-galactopyranoside, gloriogenin-3-O-β-D-glucosyl(1→2)[β-D-glucosyl(1→3)]-β-D-glucopyranoside, gloriogenin-3-O-β-D-glucosyl(1→2)[β-D-glucosyl(1→3)]-β-D-galactopyranoside, manogenin-3-O-β-D-lycotetraoside, manogenin-3-O-α-L-rhamnopyranosyl-β-lycotetraoside, 3-O-β-D-glucosyl(1→2)-β-D-galactopyranosyl-25(R)5β-spiro-stan-3β,12β-diol, 3-O-β-D-glucosyl(1→2)[β-D-glucosyl(1→3)]-β-D-glucopyranosyl-25(R)5β-spirostan-3β,12β-diol and 3-O-β-D-glucosyl(1→2)-β-D-galactopyranosyl-25(R)5β-spirostan-2β,3β,12β-triol respectively; YG-1, YG-2 and YG-3 also isolated (*Phytochemistry* 1991, *30,* 633, 1993); isolation of a new ketosapogenin - yuccagenone - from leaves and its structure elucidated as 25(R)5α-spirostan-3-one (*Khim. Prir. Soedin.* 1991, 244; *Chem. Abstr.* 1992, *116,* 148244 s); steroidal glycosides (5.0,10.0), yuccaloiside B (0.13, 0.15) and yuccaloiside C (0.11, 0.12 air-dried wt.%) determined in leaves and flowers respectively (*Khim. Prir. Soedin.* 1991, 295; *Chem. Abstr.* 1992, *116,* 170160 h); isolation of luvigenin and hecogenin from leaves (*Khim. Prir. Soedin.* 1991, 432; *Chem. Abstr.* 1992, *116,* 124905 g); linoleic (50.41), palmitic (25.88), oleic (11.83), margarinic (9.9) and stearic (1.93%) acids determined in fatty acid fraction of leaves whereas β-sitosterol (71.2), cholesterol (19.9%) identified in sterol fraction (*Izv. Akad. Nauk. Gruz., Ser. Khim.* 1991, *17,* 311; *Chem. Abstr.* 1993, *119,* 55842 g).

NEW COMPOUNDS



YS-VI
R = β-OH, R' = Gal(2→1)Glu, ~~ = β
YS-VII
R = H, R' = Glu[(2→1)Glu](3→1)Glu, ~~ = β
YS-VIII
R = H, R' = Gal[(2→1)Glu](3→1)Glu, ~~ = β
YS-IX
R = α-OH, R' = Gal(4→1)Glu[(2→1)Glu](3→1)Xyl, ~~ = α
YS-X
R = α-OH, R' = Gal(4→1)Glu[(2→1)Glu](3→1)Xyl(4→1)Rha, ~~ = α

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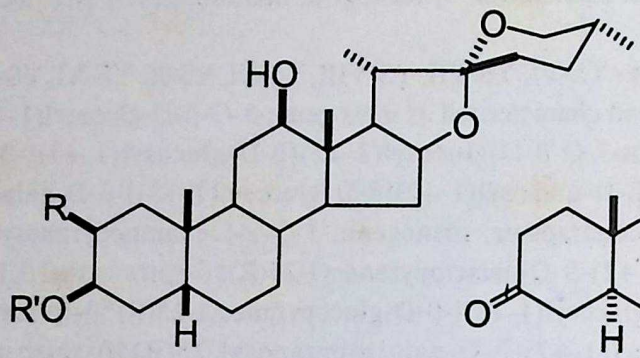

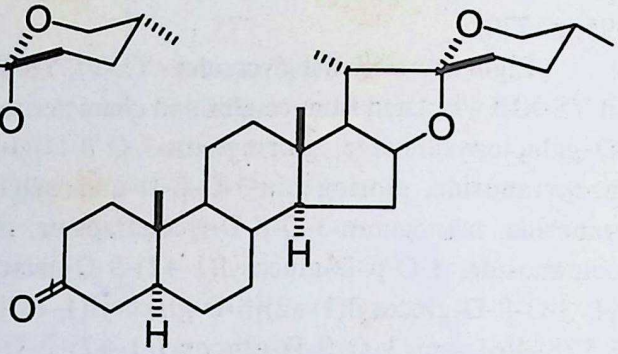

YS-XI
R = H, R' = Gal(2→1)Glu
YS-XII
R = H, R' = Glu[(2→1)Glu](3→1)Glu
YS-XIII
R = OH, R' = Gal(2-→1)Glu

Yuccagenone

ZANTEDESCHIA (Araceae)

Z. aethiopica (L.) Spreng. (*Compend. Indian Med. Plants*, Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 688).

A cytokinin, 6-(o-hydroxybenzylamino)-1-methylthio-9β-D-glucofuranosylpyrine along with swertisin, swertiajaponin, cyanidin, peonidin and ferulic acid isolated (*Fitoterapia* 1992, *63,* 189).

ZANTHOXYLUM (Rutaceae)

Z. alatum Roxb.; see *Z. armatum* DC.

Z. armatum DC. syn. *Z. alatum* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 771).

Linalool (72.0), methyl cinnamate (12.2), limonene (6.2) and β-phellandrene (5.3%) determined as major constituents of pericarp essential oil by GC-MS (*J. Essent. Oil Res.* 1991, *3,* 467; *Chem. Abstr.* 1992, *116,* 27788 p); seed essential oil composed of linalool (58.3), limonene (24.46) and methyl cinnamate (8.92%); 6-hydroxynonadec-4(Z)-enoic, 8-hydroxypentadec-4(Z)-enoic, 7-hydroxy-7-vinylhexadec-4(Z)-enoic and hexadec-4(Z)-enoic acids isolated from seeds (*J. Nat. Prod.* 1993, *56,* 456).

Z. budrunga (Roxb.) DC.; see *Z. rhetsa* (Roxb.) DC.

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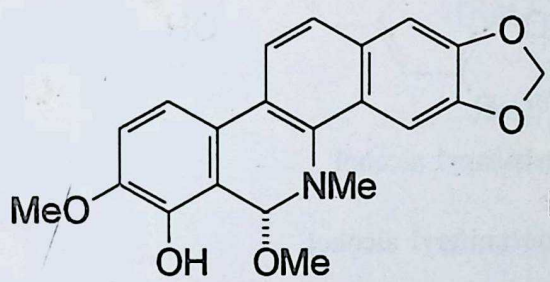
Z. hamiltonianum Wall. ex Hook.f.; see *Z. nitidum* (Roxb.) DC.

Z. nitidum (Roxb.) DC. syn. *Z. hamiltonianum* Wall. ex Hook.f. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 771).

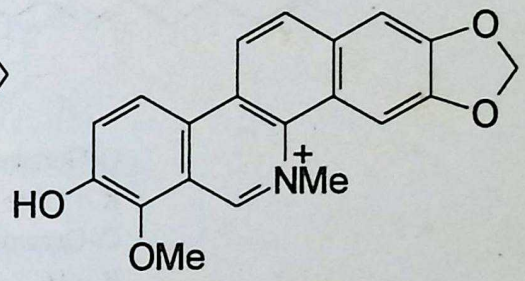
Root extract inhibited topoisomerase I-mediated DNA relaxation and stabilised the covalent binary complex formed between topoisomerase I and DNA (*J. Org. Chem.* 1993, *58,* 5025).

A new benzophenanthridine alkaloid - 7-demethyl-6-methoxy-5,6-dihydrochelerythrine (I) - isolated and its crystal structure determined (*Huaxue Xuebao* 1989, *47,* 1048; *Chem. Abstr.* 1990, *112,* 175616 p); another alkaloid - isofagaridine - from roots and its structure determination; in addition, nitidine and chelerythrine isolated (*J. Org. Chem.* 1993, *58,* 5025).

NEW COMPOUNDS



I



Isofagaridine

BIOLOGICAL ACTIVITY

Isofagaridine, nitidine and chelerythrine (167.0 μM) inhibited relaxation of supercoiled plasmid PSP 64 DNA caused by 2.2 ng calf thymus topoisomerase I (*J. Org. Chem.* 1993, *58,* 5025).

Z. rhetsa (Roxb.) DC. syn. *Z. budrunga* (Roxb.) DC., *Fagara rhetsa* Roxb. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 772).

Isolation of rutaecarpine from seeds and fruits (*Planta Med.* 1989, *55,* 403); two new alkaloids - dihydroavicine and rhetsinine - isolated from bark and characterised; ^{1}H and ^{13}C-NMR assignments reported earlier for sanguinarine revised (*Heterocycles* 1991, *32,* 1365); lupeol, sesamin, rutaecarpine and skimmianine isolated (*Zhongcaoyao* 1991, *22,* 249; *Chem. Abstr.* 1991, *115,* 166449 w); stem bark afforded lupeol, rutaecarpine, xanthoxyletin, osthol and scopoletin (*J. Sci. Soc. Thailand* 1992, *18,* 181; *Chem. Abstr.* 1994, *120,* 294211 c); two new phenylpropanoids - O-geranylsinapyl and O-geranylconiferyl alcohols - and an acid amide - hazaleamide - isolated from bark of plant from Flores Island, Indonesia and their structures established (*Chem. Pharm. Bull.* 1992, *40,* 2325); bark of Indonesian plant afforded two new lignan glycosides - hazaleanin A and hazaleanin B - along with new apioglucosides - isopropylapioglucoside and 4-hydroxyguaiacol apioglucoside - whose structures established (*Chem. Pharm. Bull.* 1992, *40,* 2639); structure of mullilamdiol (p-menthan-2,3-dihydroxy-1,4-oxide) isolated from oil, revised to p-menthan-1α,2β,4β-triol (*J. Essent. Oil Res.* 1993, *5,* 659; *Chem. Abstr.* 1994, *121,* 129886 q).

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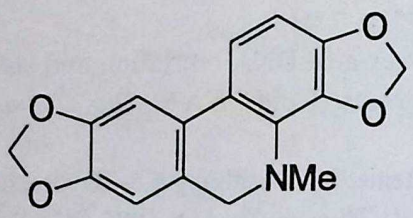
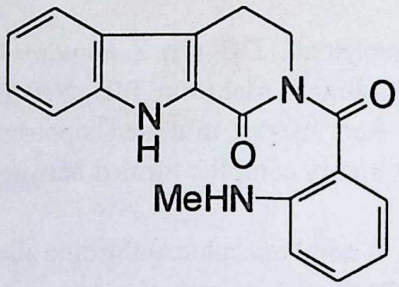
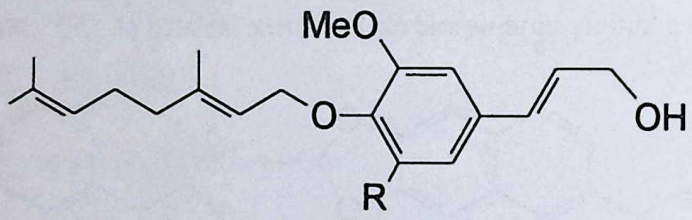
NEW COMPOUNDS



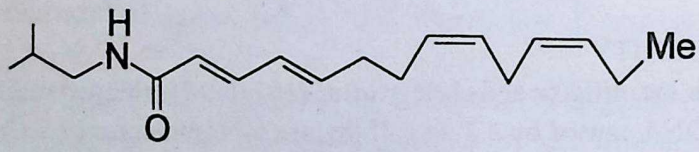
Dihydroavicine



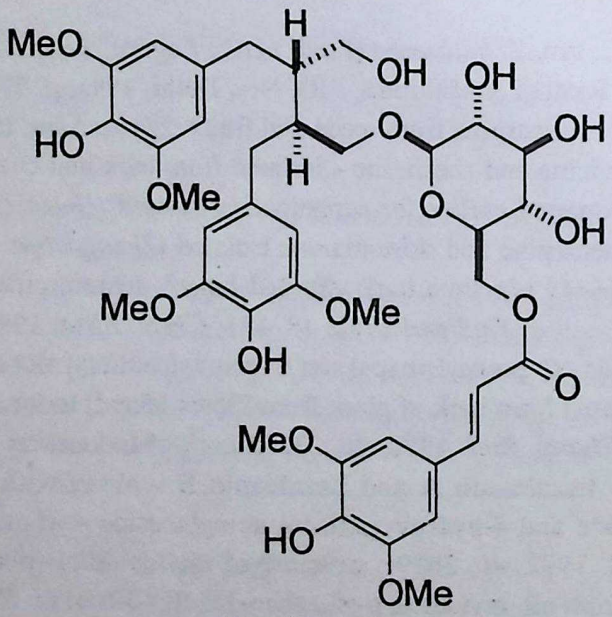
Rhetsinine



O-Geranylsinapyl alcohol
R = OMe
O-Geranylconiferyl alcohol
R = H



Hazaleamide



Hazaleanin A

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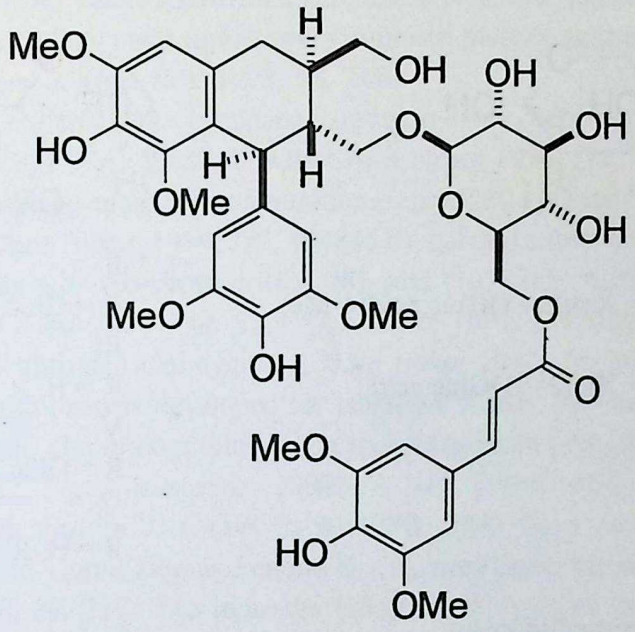
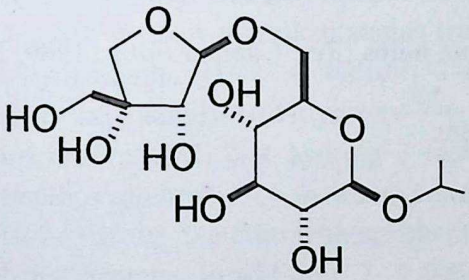
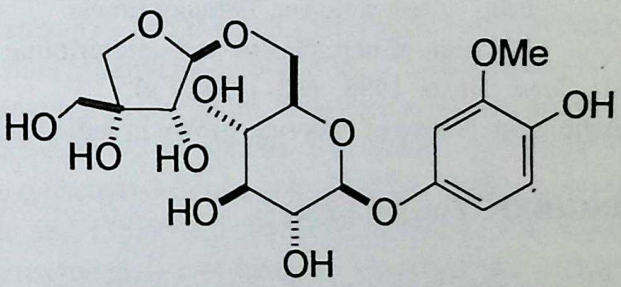


Hazaleanin B



Isopropylapioglucoside



4-Hydroxyguaiacolapioglucoside

BIOLOGICAL ACTIVITY

Hazaleamide exhibited moderate antimalarial activity *in vitro* (*Chem. Pharm. Bull.* 1992, *40,* 2325).

ZEA (Poaceae)

Z. mays L. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 772).

Six. glucurono-xylooligosaccharides (I - VI) isolated from acid hydrolysate of corn hulls and their structures elucidated (*Agric. Biol. Chem.* 1990, *54,* 1319).

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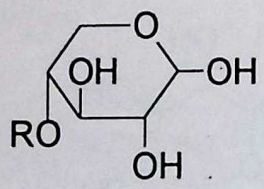

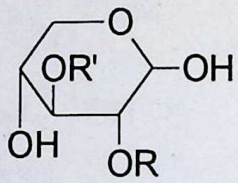

I
R = Xyl(2→1)Gluc.acid(4-Me)
IV
R = Xyl(2→1)Gluc.acid

II
R = Gluc.acid(4-Me), R' = H
III
R = H, R' = Gluc.acid(4-Me)
V
R = Gluc. acid, R' = H
VI
R = H, R' = Gluc.acid

ZEPHYRANTES (Amaryllidaceae)

Z. tubispatha Herb.

Eng. - Zephyr flower, Thunder flower.

Isolation of narciclasine and narciprimine from bulbs (*Rev. Cubana Farm.* 1989, *23,* 151; *Chem. Abstr.* 1990, *112,* 115819 x).

Distribution: Native of America, grown in Indian gardens.

ZINGIBER (Zingiberaceae)

Z. cassumunar Roxb.; see *Z. purpureum* Rosc.

Z. chrysanthum Rosc.

1,8-Cineole (42.0), α-fenchyl acetate (15.0), camphene (6.0) and α-terpineol (6.0%) determined in rhizome essential oil by GC-MS (*J. Essent. Oil Res.* 1992, *4,* 479; *Chem. Abstr.* 1993, *118,* 120948 s).

Distribution: Uttar Pradesh, Sikkim and Assam, ascending to 1600 m in the hills.

Z. officinale Rosc. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 774).

An active fraction from acetone extract of ginger significantly inhibited serotonin-induced hypothermia. Acetone extract (75.0 mg/kg) orally also inhibited 5HT-induced diarrhoea; (6)-shogaol, (6)-dehydrogingerdione, (8)- and (10)-gingerols identified as active constituents of extract (*Yakugaku Zasshi* 1990, *110,* 936; *Chem. Abstr.* 1991, *114,* 114876 t); acetone extract showed antimicrobial activity against *Bacillus subtilis* and *Escherichia coli* K-12 (*Bokin*

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Bobai 1992, *20,* 309; *Chem. Abstr.* 1992, *117,* 190559 u); supplementation of butter in diet of healthy male volunteers for 7 days significantly enhanced platelet aggregation, whereas, addition of dry ginger (5.0 g) with fatty meal significantly inhibited platelet aggregation induced by ADP and epinephrine (*Indian J. Med. Res.* 1993, *98,* 240).

Zingiberene, α-curcumene, α-copaene, undecan-2-one, neral and geranial isolated from root essential oil (*Huaxue Shijie* 1989, *30,* 420; *Chem. Abstr.* 1990, *112,* 175611 h); zerumbone, zerumbodienone, humulene epoxide I and humulene epoxide 2 isolated from roots (Jpn. 1, 221, 344 (1989) Sep. 04; *Chem. Abstr.* 1990, *112,* 104845 b); galanolactone and (E)8β,17-epoxylabd-12-en-15,16-dial along with (6)-shogaol, (6)-, (8)- and (10)-gingerols isolated from Japanese ginger (*Shoyakugaku Zasshi* 1990, *44,* 55; *Chem. Abstr.* 1991, *114,* 12041 z); isolation of (8)- and (10)-gingerols as antimicrobial agents (*Bokin Bobai* 1992, *20,* 309; *Chem. Abstr.* 1992, *117,* 190559 u); a rapid process developed for isolation of (6)-, (8)- and (10)-gingerols from roots by counter-current chromatography; slight modification in procedure enabled separation of (4)-gingerol also (*J. Lig. Chromatogr.* 1990, *13,* 941; *Chem. Abstr.* 1990, *113,* 65125 r); synthesis of shogaol (*Indian J. Chem.* 1990, *29*B, 284); four new diarylheptenones - gingerenones A, B and C and isogingerenone B - isolated from rhizomes and characterised (*Phytochemistry* 1990, *29,* 797); two more diarylheptanoids isolated from rhizomes and their structures elucidated as meso-3,5-diacetoxy-1,7-bis(4-hydroxy-3-methoxyphenyl)heptane and 3,5-diacetoxy-1-(4-hydroxy-3,5-dimethoxyphenyl)-7-(4-hydroxy-3-methoxyphenyl)heptane; dehydroxytetrahydrocurcumin and hexahydrocurcumin also isolated (*Chem. Pharm. Bull.* 1991, *39,* 120); six new diarylheptanoids from rhizomes and their characterisation as 5-hydroxy-7-(4-hydroxyphenyl)-1-(4-hydroxy-3-methoxyphenyl)-3-heptanone, 3,5-diacetoxy-7-(3,4-dihydroxyphenyl)-1-(4-hydroxy-3-methoxyphenyl)heptane, 5-hydroxy-1-(4-hydroxy-3,5-dimethoxyphenyl)-7-(4-hydroxy-3-methoxyphenyl)-3-heptanone, 5-hydroxy-7-(4-hydroxy-3,5-dimethoxyphenyl)-1-(4-hydroxy-3-methoxyphenyl)-3-heptanone, (3R,5S)3,5-dihydroxy-1,7-bis(4-hydroxy-3-methoxyphenyl)heptane and (3S,5S)3,5-diacetoxy-1,7-bis(3,4-dihydroxy-phenyl)heptane; in addition, 7-(3,4-dihydroxyphenyl)-1-(4-hydroxy-3-methoxyphenyl)hept-4-en-3-one and (3S,5S)3,5-dihydroxy-1,7-bis(4-hydroxy-3-methoxyphenyl)heptane also isolated (*Phytochemistry* 1991, *30,* 3647); determination of (6)-, (8)- and (10)-gingerols, galanolactone and (E)8β,17-epoxylabd-12-en-15,16-dial in Japanese ginger by HPLC (*Shoyakugaku Zasshi* 1991, *45,* 316; *Chem. Abstr.* 1992, *116,* 252112 h); 6-hydroxy-1-(4-hydroxy-3-methoxyphenyl)-4-decen-3-one (I) and three alkyl analogs of 3,6-epoxy-1-(4-hydroxy-3-methoxyphenyl)-3,5-diene (II) isolated and characterised (*Chem. Express.* 1992, *7,* 221; *Chem. Abstr.* 1992, *117,* 128142 z); rhizomes afforded (6)-gingerdiol and its four analogs identified as (3R,5S)5-acetoxy-3-hydroxy-1-(4-hydroxy-3-methoxyphenyl)decane, (3R,5S)3-acetoxy-5-hydroxy-1-(4-hydroxy-3-methoxyphenyl)decane, (3R,5S) 3,5-diacetoxy-1-(4-hydroxy-3-methoxyphenyl)decane and (3R,5S)3,5-diacetoxy-1-(3,4-dimethoxyphenyl)decane (*Phytochemistry* 1992, *31,* 1783); an antitulcer compound - 6-gingesulphonic acid - and three monoacyldigalactosylglycerols - gingerglycolipids A, B and C - isolated from dried rhizomes of Taiwan plant and their structures established (*Chem. Pharm. Bull.* 1992, *40,* 2239; *ibid.* 1994, *42,* 1226); in additon,

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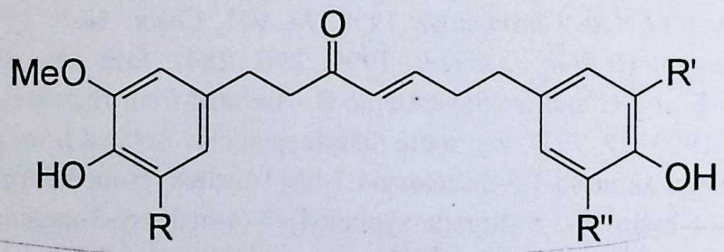
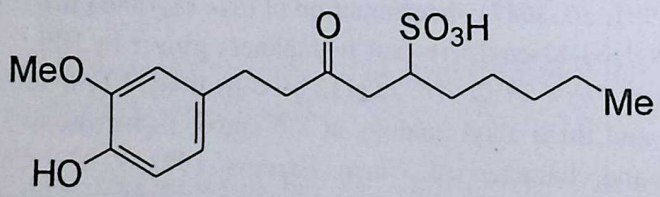
(+)angelicoidenol-2-O-β-D-glucoside isolated and its stereostructure confirmed by synthesis (*Chem. Pharm. Bull.* 1994, *42,* 1226); identification of zingiberene, β-sesquiphellandrene, arcurcumene, γ-cadinene, γ-bisabolene, sesquisabinene hydrate, geranial, borneol, zingiberenol, citronellol, sesquiphellandrene and geranyl acetate in essential oil of Korean ginger by GC-MS (*Han'guk Nonghwa Hakhoe Chi* 1992, *35,* 59; *Chem. Abstr.* 1992, *117,* 110405 c); camphene, 1,8-cineole, citronellol, geranial, limonene, linalool, myrcene, neral, β-phellandrene, β-pinene, β-sesquiphellandrene, terpinolene, zingiberene, ar-curcumene, geranyl acetate, heptane-2-ol, 6-methylhept-5-en-2-one, citronellal and α-copaene identified in ginger oil by GC (*Zhongguo Nongye Huaxue Huizhi* 1992, *30,* 14; *Chem. Abstr.* 1992, *117,* 130135 t); ar-curcumene, β-sesquiphellandrene, α-zingiberene, β-bisabolene and 6,4'-dichloroflavan isolated from dried rhizomes (*J. Nat. Prod.* 1994, *57,* 658).

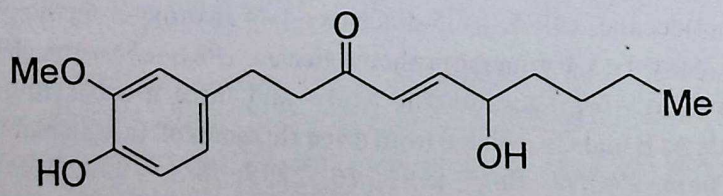
NEW COMPOUNDS



Gingerenone A
R,R'' = H, R' = OMe
Gingerenone B
R = H, R',R'' = OMe
Gingerenone C
R,R',R'' = H
Isogingerenone B
R,R' = OMe, R'' = H



6-Gingesulphonic acid



I

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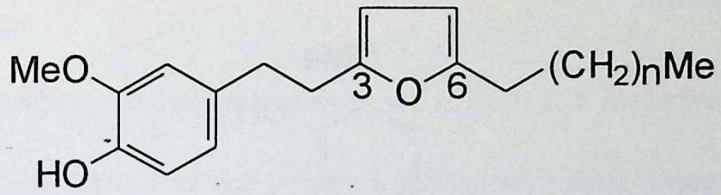
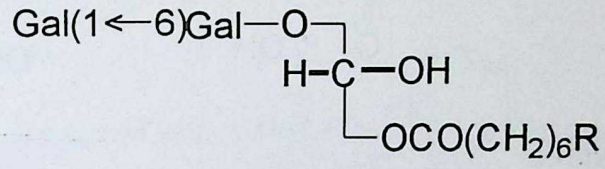
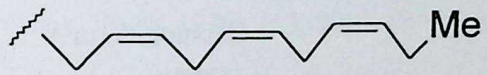


II

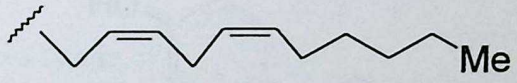
n = 2, 4, 6



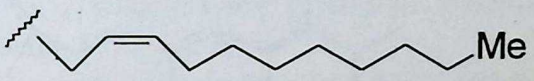
Gingerglycolipid A

R = 

Gingerglycolipid B

R = 

Gingerglycolipid C

R = 

BIOLOGICAL ACTIVITY

Zerumbone (10.0 μg/ml) compeletly inhibited growth of mouse L1210 leukaemia cells (Jpn. 1,221,344 (1989) Sep. 04; *Chem. Abstr.* 1990, *112,* 104845 b); (6)-shogaol from active fraction inhibited 5HT-induced hypothermia at 10.0 mg/kg (*Yakugaku Zasshi* 1990, *110,* 936; *Chem. Abstr.* 1991, *114,* 114876 t); gingerenone A exhibited moderate anticoccidium activity *in vitro* in cultured kidney cells of chicken and strong antifungal effect against *Pyricularia oryzae* (*Phytochemistry* 1990, *29,* 797); 6-gingesulphonic acid exhibited antiulcer activity which was stronger than that of (6)-gingerol and (6)-shogaol (*Chem. Pharm. Bull.* 1992, *40,* 2239; *ibid.* 1994, *42,* 1226); β-sesquiphellandrene showed acitivity against rhinovirus *in vitro* with IC50 0.44 μM (*J. Nat. Prod.* 1994, *57,* 658).

Z. purpureum Rosc. syn. *Z. cassumunar* Roxb. (*Compend. Indian Med. Plants,* Vol. 3, Rastogi & Mehrotra, PID, New Delhi, 1993, p. 691).

Two new phenylbutenoid dimers isolated from fresh rhizomes and their structures elucidated as trans-3(2,4,5-trimethoxyphenyl)-4[(E)3,4-dimethoxystyryl]cyclohexene and cis-1,2-bis[(E)3,4-dimethoxyphenyl]cyclobutane; in addition cis- and trans-3-(3,4-dimethoxyphenyl)-4[(E)3,4-dimethoxystyryl]cyclohexenes isolated (*Phytochemistry* 1993, *32,* 357); three potent antioxidants - cassumunarins A, B and C - isolated from rhizomes and characterised (*Tetrahedron Lett.* 1994, *35,* 981).

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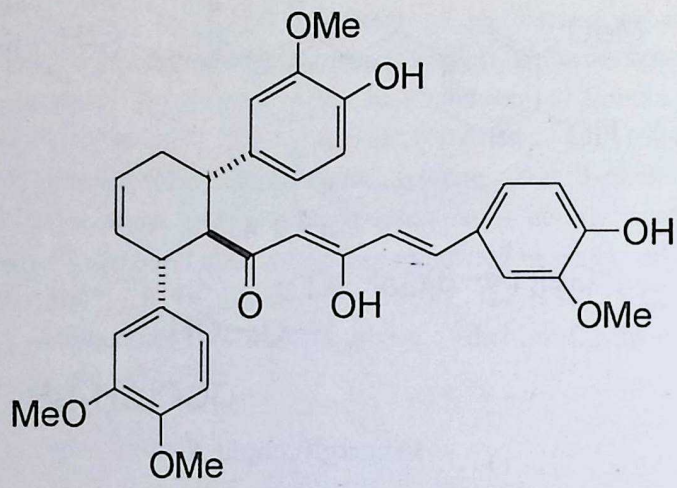
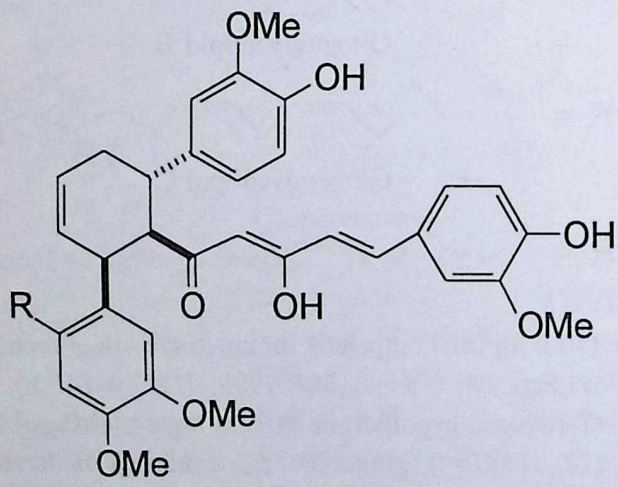
NEW COMPOUNDS



Cassumunarin A



Cassumunarin B
R = H
Cassumunarin C
R = OMe

Z. zerumbet (L.) Smith (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 775).

Four acetylated flavonol glycosides isolated from rhizomes and characterised as 3-O-rhamnosyl, 3-O-(2"-O-acetyl)rhamnosyl, 3-O-(3"-O-acetyl)rhamnosyl and 3-O-(4"-O-acetyl)rhamnosyl derivatives of kaempferol (*Phytochemistry* 1991, *30,* 2391); two more glycosides isolated from rhizomes and their structures elucidated as kaempferol-3-O-(3",4"-O-diacetyl)-α-L-rhamnoside and kaempferol-3-O-(2",4"-O-diacetyl)-α-L-rhamnoside; in addition, 3-O-methyl and 3,4'-O-dimethyl ethers of kaempferol isolated (*Agric. Biol. Chem.* 1991, *55,* 455); zerumbone (72.3%) determined as major constituent of essential oil of Vietnamese plant (*J. Essent. Oil Res.* 1993, *5,* 533; *Chem. Abstr.* 1994, *121,* 153277 n).

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ZINNIA (Asteraceae)

Z. elegans Jacq. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 775).

Saponins from plant exhibited β-haemolysis against buffalo, sheep and human blood (*Pakistan Vet. J.* 1990, *10,* 146; *Chem. Abstr.* 1992, *116,* 102686 j); acetylated 3,5-diglucosides of cyanidin and pelargonidin isolated from red flowers (*Phytochemistry* 1990, *29,* 1269).

ZIZIPHORA (Lamiaceae)

Z. clinopodioides Lam. (*Compend. Indian Med. Plants,* Vol. 1, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 441).

Oleanolic acid, chrysin-7-O-rutinoside, linarin and diosmin identified in aerial parts (*Arm. Khim. Zh.* 1990, *43,* 210; *Chem. Abstr.* 1990, *113,* 227996 e).

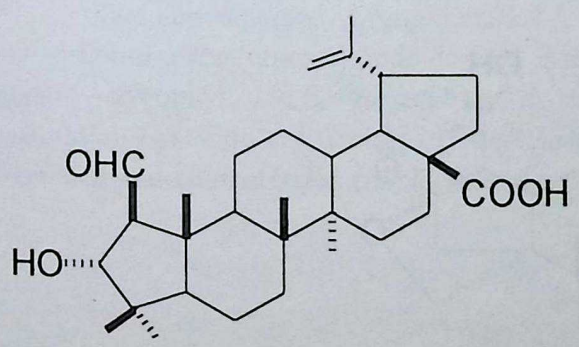
ZIZYPHUS (Rhamnaceae)

Z. jujuba Lamk.; see *Z. mauritiana* Lamk.

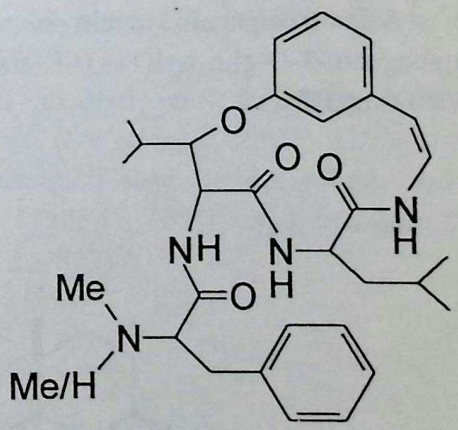
Z. jujuba Mill. syn. *Z. sativa* Gaertn., *Z. vulgaris* Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 775).

A new triterpenoid - zizyberanalic acid - isolated from bark and its structure elucidated (*Phytochemistry* 1989, *28,* 3155); isolation of three cyclopeptide alkaloids - sanjoinine I, sanjoinine II and sanjoinine III - from seeds and their characterisation (*Saenghwahak Nyusu* 1990, *10,* 239; *Chem. Abstr.* 1991, *115,* 15368 t); total synthesis of frangulanine (*Chem. Commun.* 1991, 1002).

NEW COMPOUNDS



Zizyberanalic acid



Sanjoinine I

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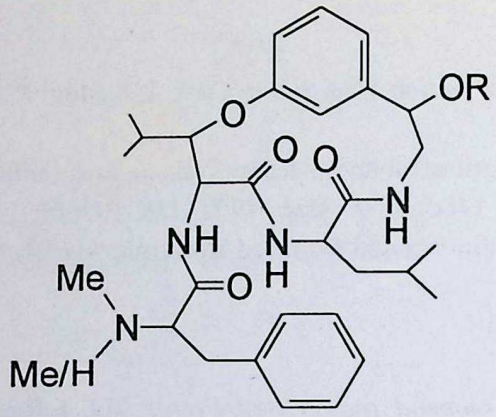


Sanjoinine II
R = Me
Sanjoinine III
R = H

Z. mauritiana Lamk. syn. *Z. jujuba* Lamk. (non Mill.) (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 777).

Leaves of plant harvested in October contained flavonoids (2.76%), of which rutin constituted 2.25% (*Zhongguo Zhongyao Zazhi* 1992, *17,* 81; *Chem. Abstr.* 1992, *116,* 231937 r).

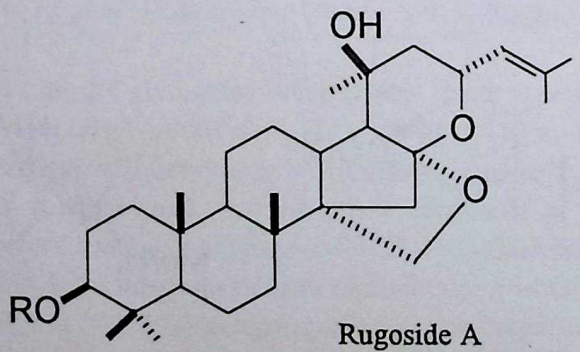
Z. nummularia (Burm.f.) Wt. & Arn. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 777).

Mass spectrometric studies of nummularines M and N (*Proc. Pak. Acad. Sci.* 1989, *26,* 227; *Chem. Abstr.* 1991, *114,* 43273 f).

Z. rugosa Lamk. (*Compend. Indian Med. Plants,* Vol. 4, Rastogi & Mehrotra, PID, New Delhi, 1995, p. 779).

A new triterpenoid saponin - rugoside A - isolated from bark and its structure determined as jujubogenin-3-O-glucosyl(1→3)-L-arabinoside (*Fitoterapia* 1993, *64,* 341).

NEW COMPOUNDS



Rugoside A
R = Ara(3→1)Glu

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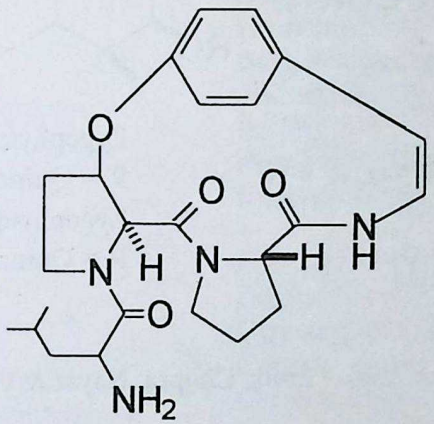
Z. sativa Gaertn.; see *Z. jujuba* Mill.

Z. spina-christi Willd.

A new peptide alkaloid - spinanine A - isolated from stem bark and its structure elucidated; in addition, zizyphine F, jubanine A and amphibine H isolated (*Phytochemistry* 1991, *30,* 1348).

Distribution: Native to North Africa and West Asia, reported to have been Introduced into India.

NEW COMPOUNDS



Spinanine A

Z. vulgaris Lamk.; see *Z. jujuba* Mill.

ZYGOPHYLLUM (Zygophyllaceae)

Z. coccineum L.; see *Z. propinquum* Decne.

Z. propinquum Decne. syn. *Z. coccineum* auct. (non L.) (*Compend. Indian Med. Plants,* Vol. 2, Rastogi & Mehrotra, PID, New Delhi, 1991, p. 725).

Two new saponins - zygophylosides A and B - isolated and characterised; in addition, 3-O-[β-D-quinovopyranosyl]quinovic acid isolated (*J. Nat. Prod.* 1990, *53,* 1193); another saponin - zygophyloside C - isolated and its structure established; β-sitosterol glucoside and erythrodiol-3-caffeate also isolated (*Phytochemistry* 1992, *31,* 1051); zygophylosides D and E isolated and characterised (*Phytochemistry* 1993, *33,* 453).

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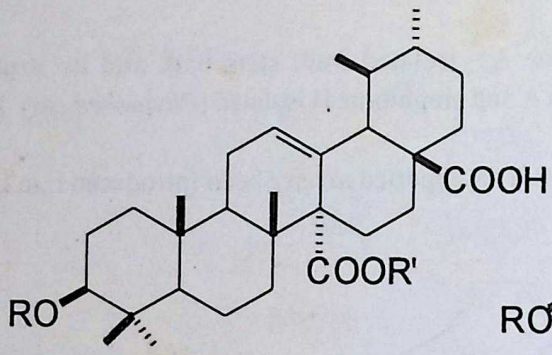

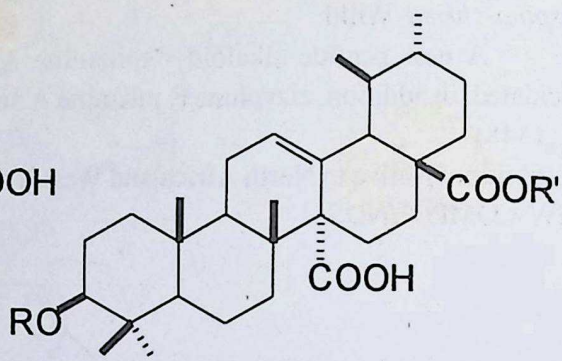

Zygophyloside A
R = Quinovose(2→1)Ara, R' = H
Zygophyloside B
R = Quinovose, R' = Glu
Zygophyloside C
R = Quinovose(2→1)Ara, R' = Glu

Zygophyloside D
R = Quinovose(2-SO_3H), R' = H
Zygophyloside E
R = Quinovose(2-SO_3H), R' = Glu

Z. simplex L. (*Glossary Indian Med. Plants,* Chopra, Nayar & Chopra, PID, New Delhi, 1956, p. 262).

An acylated glycoside isolated from aerial parts and its structure determined as 6"-[2(E)butenoyl]isorhamnetin-3-O-glucoside; isorhamnetin, its 3-O-glucoside, kaempferol-3-O-rutinoside, sitosterol glucoside and quinovic acid-3α-L-rhamnoside also isolated (*Phytochemistry* 1992, *31,* 3293).

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Abbreviations used : B.-Bengal; Bo.-Bombay; Eng.-English; Guj.-Gujarat; H.-Hindi; Kan.- Kanarese; Kash.-Kashmir, Mal.-Malayalam; Mar.-Maharashtra; Nep.-Nepal; P.-Punjab; S.-Sanskrit; Tam.-Tamil; Tel.-Telugu

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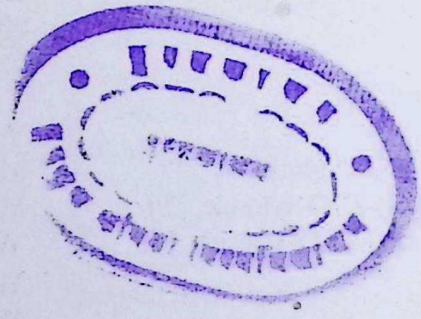

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